ARCHIVES OF OPHTHALMOLOGY.

RECENT EXPERIENCES IN OPERATIONS FOR SECONDARY CATARACT.

By HERMAN KNAPP.

UNTIL the beginning of May, 1898, I could say that I had neither lost an eye, nor permanently injured one, by discission of a secondary cataract, an operation I have practised during the last twenty-five years on many hundreds of eyes. I can say so no longer, for an eye, the lens of which had been removed successfully and with restoration of good sight by simple extraction, lost its sight by the advent of acute glaucoma following discission of the somewhat opaque capsule, glaucoma which I failed to cure by operation in contrast to all similar cases that had previously come under my care. This sad occurrence determines me to publish the patient's history without delay, together with all the other operations for secondary cataract I have performed during the nine months beginning with October, 1897.

The case was as follows:

Mrs. John J. Gillette, aged seventy-six, of New Haven, Ct., had a mature cataract removed from her left eye, March 22, 1898. In two weeks she was discharged with a round, movable pupil, the iris free from anterior and posterior adhesions. There had been no reaction and the eye was in good condition. V = $\frac{2}{7}\frac{0}{0}$, with dilated pupil even $\frac{2}{4}\frac{0}{0}$. In six weeks, she presented herself again. The eye had not given her any trouble, and was healthy in every respect. The lens capsule was transparent in the upper part, the scar from the curved incision by which the capsule had been opened during the extraction was completely hidden behind the iris, the middle and lower parts of the capsule were beset with irregular white dots and lines, intracapsular thickenings of long standing.

Thinking it certain that subsequent wrinkling and further dotting of the capsule would diminish the acuteness of sight, I advised discission, which was consented to and performed, May 5, 1898. After dilatation of the pupil with a drop of atropine, and the eye having been anæsthetized with holocaïn, I swept a medium-sized knife-needle around the inner and upper portions of the capsule, so that the thickened central and lower portions could withdraw toward the lower and outer periphery by the subsequent cicatricial contraction. To assist nature in this action, I slightly pressed the capsule down and outward. Pupil clear, sight good. Bandage.

The next two days no reaction, S excellent. Then, May 7th, at 7 P.M., pain in and around the eye, which grew more and more intense during the night. She was nauseated and vomited repeatedly, in spite of pilocarpin, eserin, and morphin (hypodermic, 0.01, three times). In the night, at 1 A.M., T+1; at 4 A.M., T+2; at 10.30 A.M., T+2. Eye not particularly red, anterior chamber shallow, iris and cornea dull, pupil contracted to 3 *mm* in diameter by eserin. Counted fingers, but they appeared dull.

As the examination showed a plain case of very acute glaucoma, I advised an immediate operation, to which the suffering patient willingly consented. Under full ether-anæsthesia, the house-surgeon, Dr. Hogsett, and two nurses assisting, I made an incision of 5 *mm* with a lance-shaped knife along the upper border of the cornea, a little behind the scarcely visible scar of the extraction wound. First aqueous, then a small quantity of vitreous escaped. An attempt to draw the iris out with a forceps failed, the same an attempt with Tyrell's blunt hook. A second attempt with the hook brought iris out of the wound, but it slipped back at the moment I was going to abscise it. As the pupil was extended toward the wound, I abstained from further trials, remembering that a similar case I had operated on before, had turned out well and that Prof. H. PAGENSTECHER states that he had operated in all such, cases successfully by a simple paracentesis.[1]

The patient was immediately relieved by the operation. The cornea, iris, and pupil cleared up, the anterior chamber was deep, and the sight good. On May 11th, four days after the operation for glaucoma, at 7 P.M., the eye began to feel uncomfortable, later it was painful, severely so at 2 A.M., and the patient was nauseated. Pilocarpin instillations and morphin quieted her, and

[1] See his paper: "Über Glaucom nach Staaroperationen." *Klin. Mon. f. Aughk.*, xxxiii., 1895, p. 144.

she slept well. +T ?. Under similar symptoms she passed a few days tolerably well, suffering pain in eye, especially at night. The symptoms pointed as much toward iritis as toward glaucoma. The ant. chamber was somewhat shallow.

May 13th, six days after the operation, the cornea, iris, and pupil were dull, there was a trace of sediment in the anterior chamber, and the vitreous gave a grayish reflex. T+½. Patient saw only movements of the hand.

I operated on her again, under ether, made the incision larger, extracted the iris with a blunt hook, at the first attempt, and abscised it. Patient was immediately relieved and improved steadily. The sediment in the anterior chamber disappeared; the cornea and iris cleared up, the pupil was free, but the vitreous remained cloudy, and there was no pupillary reflex. Tn. She was discharged June 4th, without pain, the eye scarcely red. F and Tn. Counted fingers at six inches with + 13 D.

Dr. Arth. Alling, of New Haven, who saw her several times since her return home, stated, July 17th, that the eye was free from pain and irritation, its tension slightly diminished, no red pupillary reflex. She could, with that eye, barely count fingers at a distance of four feet.[1]

Rare cases, we know, often come in pairs. A parallel case to the preceding occurred not long after, but the glaucoma was promptly cured by an iridectomy. It was as follows:

Mrs. Mary Quick, æt. fifty-nine, of New York. Smooth, simple extraction in left eye, May 9, 1898; discharged in two weeks, with S = $\frac{20}{100}$; before discission, June 6, 1898, $\frac{20}{40}$. Capsule thickened on nasal side. Discission over the nose by an incision with knife-needle from below and out toward up and slightly in, with another incision from outer pupillary edge into the vertical one (, seen from above). No reaction until four days later (June 10th). Had pain in the night, increasing nausea, and vomiting. Eserin, morphin. When I saw her, June 10th, 2 P.M., I found cornea and iris dull. Capsule crowded to nasal side, where iris was bulging, while on the temporal side it was dipping down. Counted fingers indistinctly at several feet. T+2.

The diagnosis of acute glaucoma being evident, I etherized the patient, made a peripheric incision 5 or 6 *mm* long in the sclero-

[1] See supplementary note at the end of this article.

corneal band, drew the iris out with a blunt hook, at the first attempt, and cut it. Some vitreous escaped. The wound healed without disturbance. The patient was discharged on the thirteenth day after the iridectomy, with a clean coloboma, a well eye, and V = $\frac{20}{40}$.

There was, in this series, another mild case of glaucoma, which recovered by instillation of mydriatics.

From October, 1897, to June, 1898, inclusive, I made 152 extractions of primary cataract, and 70 operations for secondary cataract. Among the latter there were 64 discissions with the knife-needle, 1 cyst-iridectomy, and 5 operations with the forceps-scissors.

The latter are comparatively new to me. In former years I made some of these operations with De Wecker's forceps-scissors. They yielded no satisfactory results, and I gave them up in favor of iridectomy and cyst-iridectomy. At present, the operative technique being so much improved, and asepsis making cutting within the eye comparatively harmless, I have taken them up again. The five operations in this series have proved quite satisfactory, considering that they were made on eyes much more affected than those in which discission is indicated.

As to discission, the results have been very gratifying: 64 were improved, in 5 the vision remained the same, 1 (the case detailed above) was a sad failure, good sight being, it seems, hopelessly lost. The visual results are recorded from the last examinations made, but these in the majority of cases were also the first examinations, *i. e.*, when the patients left the hospital, which means, at an average, six or seven days after the operation. At that time the vitreous has not yet so much cleared up as it will have later. I state that all the cases I operated on are included, no distinction being made between uncomplicated and complicated cases. The subjoined table will show what the vision was before and after the discission. Where there was an abnormity or disturbance in the recovery it is marked. The series shows that the discission of secondary cataract, as performed with a knife-needle, through the cornea, has continued to show a high degree of safety and efficiency.

VISUAL RESULTS IN SEVENTY SUCCESSIVE CASES BEFORE A

Compiled by the House Surgeon, Dr. C. Y. Hogsett,

No. of Catar. B'k	Running No.	Name.	Age.	Date of Extr.	V after Extr.	V before Sec. Op.	Date of Sec. Op.	
1363	1	Caroline Sturtevant	50	Oct. 16, 1891	$\frac{20}{200}$	$\frac{12}{200}$	Oct. 8, 1897	Pupil round, iris free from adhesions ment in periphery. Operation: Sc was introduced closed, pointed bla ducing irido-dialysis before it could the capsule and under it to the opp opening made in the capsule seeme ing enlarged by a cut in an upwa vitreous. Oct. 9, 1897.—No reacti readily. Oct. 16.—V = $\frac{20}{200}$. Oph
1848	2	Ann Thompson (right eye)	63	Oct. 20, 1894	$\frac{20}{100}$	$\frac{10}{100}$	Jan. 5, 1898	Evenly wrinkled capsule, quite thick.
1414	3	Henry Bohle	36	Jan. 30, 1892	$\frac{20}{60}$	$\frac{15}{200}$	Oct. 16, 1897	+ inc. . . . .
2070	4	Mrs. B. F. Benedict	62	May 7, 1896	$\frac{20}{60}$ +	$\frac{20}{70}$ —	Feb. 10, 1897	*Crucial incision* (+ *inc.*). . .
2155	5	I. O. Miller	73	Dec. 10, 1896	$\frac{20}{30}$	$\frac{20}{200}$	Sept. 10, 1897	T-*shaped incision* (T *inc.*). . .
2117	6	R. Sayer	63	Sept. 30, 1896	$\frac{20}{30}$ —	$\frac{20}{70}$ —	Jan. 19, 1898	Evenly wrinkled capsule. + inc. .
2124	7	Conrad Mehling	66	Oct. 14, 1896	$\frac{20}{60}$	$\frac{20}{40}$	Jan. 10, 1898	Wrinkled capsule. + inc. . .
2164	8	Mrs. E. B. Hall (left eye)	60	Dec. 31, 1896	$\frac{20}{60}$	$\frac{20}{40}$	Jan. 7, 1898	Evenly wrinkled capsule. + inc. .
2133	9	Mrs. J. A. Davidson	84	Nov. 7, 1896	$\frac{20}{40}$	$\frac{20}{100}$	Feb. 26, 1898	Evenly wrinkled capsule. + inc. .
2251	10	Geo. L. Henle	62	Oct. 10, 1897	$\frac{20}{70}$	$\frac{20}{70}$	Oct. 26, 1897	T inc. Iris adherent to capsule above
2274	11	Charlotte Stewart	34	Nov. 3, 1897	$\frac{15}{200}$	$\frac{20}{200}$	Dec. 1, 1897	Capsule thick, cortical remnants in pu
2275	12	Ellen Brennan	60	Nov. 3, 1897	C. F. 2 ft.	C. F. 1½ ft.	Dec. 1, 1897	T inc. Pupil clear after operation. .
2259	13	R. W. Hutchinson	61	Oct. 18, 1897	$\frac{20}{60}$	$\frac{20}{40}$ —	Dec. 3, 1897	T inc. Iris adherent to capsule above
2280	14	Alexander Devlin	55	Nov. 15, 1897	$\frac{20}{60}$	$\frac{20}{60}$	Dec. 15, 1897	Evenly wrinkled capsule. + inc. .
2289	15	C. T. Schramme	62	Nov. 18, 1897	$\frac{10}{200}$	$\frac{20}{200}$	Jan. 3, 1898	Capsule thick above and to temp. side
2291	16	Ann Thompson (left eye)	67	Dec. 3, 1897	$\frac{20}{200}$	$\frac{20}{200}$	Jan. 3, 1898	Evenly wrinkled capsule. + inc. .
2267	17	Mrs. Jos. Potter	75	Oct. 10, 1897	$\frac{20}{70}$	$\frac{20}{100}$	Jan. 5, 1898	Evenly wrinkled capsule. + inc. .
2288	18	Alonzo Ackerman	47	Nov. 27, 1897	$\frac{20}{60}$	$\frac{20}{60}$	Jan. 7, 1898	Evenly wrinkled capsule. + inc. .
2294	19	Mary Glavine	48	Dec. 9, 1897	$\frac{10}{200}$	$\frac{10}{200}$	Jan. 7, 1898	Cortical remnants in lower part of cap
2273	20	Annie Perpente	60	Nov. 3, 1897	$\frac{20}{70}$	$\frac{20}{70}$	Jan. 7, 1898	Iris adherent to capsule above. Caps
2284	21	Jas. Marrin	9	Nov. 22, 1897	$\frac{20}{100}$	$\frac{20}{100}$	Jan. 14, 1898	Central fibrous band, above and belo
2265	22	Annie Goodsharra	70	Oct. 23, 1897	C. F. 5 ft.	C. F. 5 ft.	Apr. 29, 1898	Iris drawn upward and pupil closed.
2289	23	Maggie Thornton	70	Nov. 27, 1897	$\frac{20}{70}$	$\frac{20}{70}$	Jan. 21, 1898	Evenly wrinkled capsule. + inc. .
2301	24	Caroline Schwind	78	Dec. 18, 1897	C. F. 10 ft.	C. F. 5 ft.	Jan. 26, 1898	Dense capsulary membrane filling part, leaving free space below. .
2304	25	Mrs. E. B. Hall (right eye)	60	Dec. 30, 1897	$\frac{20}{100}$	$\frac{20}{100}$	Jan. 31, 1898	Three fibrous bands in capsule. + i
2314	26	Florence Rice (left eye)	17	Jan. 3, 1898	C. F. 8 ft.	C. F. 8 ft.	Feb. 4, 1898	Capsule thickened. *Horizontal inci*
2330	27	Florence Rice (right eye)		Feb. 17, 1898	C. F. 12 ft.	C. F. 5 ft.	Mar. 23, 1898	Same as above. . . . .

EFORE AND AFTER OPERATION FOR SECONDARY CATARACT.

V. HOGSETT, from the case-books of cataract extractions.

Secondary Operation.	V after Sec. Op.	Remarks.
from adhesions. Capsule thickened and irregular, with deposition of small amount of pig- Operation: Small opening near corneal margin with lance knife. Esberg's *forceps scissors* ed, pointed blade being on lower surface. The forceps scissors became engaged in iris, pro- s before it could be disengaged. The pointed blade of the forceps scissors was thrust through ler it to the opposite pupillary edge. The capsule was then cut and forceps withdrawn. The e capsule seemed to be insufficient, so the forceps scissors were again introduced and the open- ut in an upward and inward direction. During operation there was no perceptible loss of 907.—No reaction, wound united, pupil somewhat dull. Oct. 10.—Pupil clear, counts fingers V = $\frac{20}{200}$. Ophthalm. exam. = Fundus still indistinct. Further improvement of S. likely.	$\frac{20}{200}$	
le, quite thick. + incision, small central opening.	$\frac{20}{80}$	
. . . . .	$\frac{20}{40}$	Vision began to fail two years after extraction.
c.).	$\frac{20}{80}$	
nc.).	$\frac{20}{40}$	
le. + inc.	$\frac{20}{40}$	
inc.	$\frac{20}{80}$	
le. + inc.	$\frac{20}{80}$	
le. + inc.	$\frac{20}{100}$	
o capsule above. Pupil slightly drawn up.	$\frac{20}{70}$	
remnants in pupillary space. + inc.	$\frac{20}{70}$	
er operation.	$\frac{18}{200}$	Myopia—changes in macular region.
o capsule above.	$\frac{20}{80}$	
le. + inc.	$\frac{20}{80}$	
nd to temp. side. T inc.	$\frac{20}{40}$	
le. + inc.	$\frac{20}{80}$	
le. + inc.	$\frac{20}{40}$ —	
le. + inc.	$\frac{20}{40}$	
wer part of capsule. T inc.	$\frac{20}{80}$	Myopic—glasses do not improve vision for distance.
le above. Capsule wrinkled. T inc.	$\frac{20}{80}$	
above and below which capsule evenly wrinkled. T inc.	$\frac{20}{70}$	During extraction, absolutely unmanageable patient. Large prolapse next day, imperfectly cut under ether. Vertical incision made through cornea, iris, and capsule at outer side of pupil with lance-knife. Horizontal cut made through iris and capsule with *Schweigger's* forceps scissors. Triangular pupil resulted, at first pretty large, then smaller again and unchanged.
d pupil closed. Angles of iris incarcerated in wound. *Iridotomy*.	C.F. 5 ft.	
ule. + inc.	$\frac{20}{40}$	
mbrane filling pupillary space. Incision capsule lower part pupil. Capsule retracts to upper space below.	$\frac{20}{70}$	
n capsule. + inc.	$\frac{20}{40}$	
Horizontal incision through centre.	$\frac{20}{200}$	Nystagmus—amblyopia.
. . . . .	$\frac{20}{200}$	Nystagmus—amblyopia.

No. of Cater. Bk	Running No.	Name.	Age.	Date of Extr.	V after Extr.	V before Sec. Op.	Date of Sec. Op.	
2298	28	Emma Edwards	48	Dec. 15, 1897	C. F. 18 ft.	C. F. 16 ft.	Feb. 7, 1898	Capsule has two thickened bands, one perp
2253	29	Cornelius O'Leary	76	Oct. 14, 1897	20/100	20/200	Feb. 14, 1898	Large opening in anterior capsule. Crucial
2295	30	Elizabeth Bellz	56	Dec. 9, 1897	20/100	20/70	Feb. 14, 1898	Fibrous cord passing obliquely across upper
2300	31	Jacob Flory	36	Dec. 17, 1897	20/100	20/70—	Feb. 24, 1898	Lens capsule vertically wrinkled. T inc.
2279	32	Edgar Schwartz	63	Nov. 10, 1897	20/70	20/70	Mar. 4, 1898	Evenly wrinkled capsule. + inc. . .
2313	33	Mrs. F. W. Lilienthal	59	Jan. 13, 1898	20/100	20/70	Mar. 8, 1898	Capsule moderately thick. T inc. . .
2283	34	Daniel Blake	60	Nov. 19, 1897	20/70	20/200	Mar. 10, 1898	Evenly wrinkled capsule. T inc. Second
2318	35	John Morrisey	77	Jan. 21, 1898	20/200	20/100	Mar. 10, 1898	T inc. *made with two needles.* . . .
2333	36	Alice Lory	35	Feb. 19, 1898	20/70	20/70	Mar. 25, 1898	Capsule moderately thick in centre. + inc
2322	37	Mary Boyer	62	Feb. 3, 1898	C. F. 6 ft.	20/200	Apr. 18, 1898	Evenly wrinkled capsule. T inc . .
2328	38	Edw. King	41	Feb. 15, 1898	C. F. 6 ft.	C. F. 15 ft.	Apr. 18, 1898	Evenly wrinkled capsule. T inc . .
2310	39	Lizzie Haverty	30	Jan. 12, 1898	20/200	20/70	Apr. 18, 1898	Evenly wrinkled capsule. T inc . .
2349	40	Hetius Marr	63	Mar. 18, 1898	C. F. 12 ft.	C. F. 18 ft.	Apr. 22, 1898	Dense vertical bands in capsule. Pupil ob
2257	41	Ellen Barber	74	Oct. 14, 1897	20/70	20/200	Apr. 22, 1898	Evenly wrinkled capsule. Cruc incisio
2356	42	Michael Duff	79	Mar. 23, 1898	C. F. 10 ft.	C. F. 18 ft.	Apr. 22, 1898	Capsule thick, especially above. T inc.
2354	43	Annie Meadows	67	Mar. 22, 1898	C. F. 10 ft.	20/200	Apr. 28, 1898	Capsule thick, especially below. + inc.
2277	44	Catherine Donnelly	50	Nov. 5, 1897	20/100—	20/70	Apr. 30, 1898	Evenly wrinkled capsule. T inc , large tri
2357	45	Marguerite Ryan	35	Mar. 26, 1898	C. F. 10 ft.	20/200	May 2, 1898	Upper ⅔ of capsule very thick. Cresc opening. . . . .
2350	46	Mrs. F. Dixon	74	Mar. 17, 1898	20/200—	20/70	May 11, 1898	Upper part of capsule very thick. —<-sl
2332	47	Peter Bruce	11	Feb. 12, 1898	20/50	20/50	May 14, 1898	Thin, evenly wrinkled capsule. T inc.
2207	48	Henrietta Harris	50	Apr. 1, 1897	20/70	20/70	May 24, 1898	Evenly wrinkled capsule. + inc. .
2342	49	L. Moeller	55	Mar. 10, 1898	20/100	20/40	May 24, 1898	Evenly wrinkled capsule. T inc. .
2217	50	John Sparrow	69	Apr. 21, 1897	20/40	20/200	May 24, 1898	Evenly wrinkled capsule. + inc. .
2346	51	Liza Hogan	44	Mar. 16, 1898	C. F. 8 ft.	C. F. 8 ft.	May 25, 1898	T inc., large opening. . . . .
2367	52	Katie Driscoll	14	Apr. 23, 1898	10/200	13/200	May 28, 1898	Thick capsule. Iris adherent to corneal v
2370	53	Sarah Dehart	63	Apr. 29, 1898	C. F. 15 ft.	C. F. 15 ft.	June 6, 1898	Capsule thick below. T inc . .
2035	54	Mrs. H. Mayer	70	Feb. 25, 1896	20/50	20/100	June 6, 1898	Evenly wrinkled capsule. T inc. .
2359	55	Geo. Schwartz	67	Apr. 12, 1898	20/70—	20/100	June 9, 1898	Capsule moderately thick in centre. T in
2293	56	S. J. Turnbridge	45	Dec. 9, 1897	20/50	20/100	June 6, 1898	Capsule thick centre and above. One in
2378	57	Mrs. Mary Ahearn	45	May 10, 1898	20/70	20/70	June 23, 1898	Evenly wrinkled capsule. T inc. .
2376	58	Mrs. Annie Belden	70	May 11, 1898	C. F. 2 ft.	13/200	June 30, 1898	Clear space in upper part capsule, adhe above; opening medium-sized. .
2337	59	Mrs. Frieda Gordon	50	Feb. 25, 1898	C. F. 1 ft.	Shadows	June 30, 1898	Thickened capsule, cortical substance i be improved by small iridectomy dow
2384	60	John O'Farrell	73	May 20, 1898	C. F. 17 ft.	20/200	June 27, 1898	Evenly wrinkled capsule. + inc. .
2390	61	Jacob Riger	64	May 27, 1898	C. F. 5 ft.	15/200	July 7, 1898	Thickened capsule. T inc. . .

AND AFTER OPERATION FOR SECONDARY CATARACT.—*(Continued.)*

Secondary Operation.	V after Sec. Op.	Remarks.
l bands, one perpendicular to other. L-shaped incision.	20/50	*Iritis followed* secondary operation, disappearing quickly under antiphlogistic treatment.
capsule. Crucial incision made through posterior capsule.	20/100	
uely across upper part of capsule. + inc. Large opening in capsule.	20/50	
inkled. T inc. Large triangular opening.	20/50	
+ inc.	20/40	
T inc.	20/50	May 17, 1898.—Capsule grown together after first discission. Fundus details indistinct, but normal. Second discission May 19th. Central but narrow opening. V = 20/50.
T inc. Second discission.	20/70	
lles.	20/50	
in centre. + inc.	20/40	
T inc	20/40	
T inc	20/200	Some corneal opacities.
T inc	20/40	
psule. Pupil oblong. ⊢-shaped inc.	20/70	Iris drawn upward and outward, and incarcerated in wound, but not prolapsed.
Cruc l incision, large opening in capsule resulting.	20/40	
bove. T inc.	20/40	
elow. + inc.	20/50	
T inc large triangular opening resulting.	20/50	
y thick. Crescentic incision lower portion; upper part retracted, leaving large central	20/50	
y thick. −<-shaped inc.	20/70	
sule. T inc. Large opening in capsule.	20/50	
+ inc.	20/50	
T inc.	20/50	
+ inc.	20/40	
	20/200	
ent to corneal wound. T inc. Medium-sized central opening.	20/50	
ic	20/100	
T inc.	20/40—	
in centre. T inc.	20/70—	
bove. One incision made obliquely in capsule, small opening resulting.	20/70	
T inc.	20/50	
t capsule, adhesion to iris below; vertical incision from lower part of capsule to clear space m-sized.	20/40	
cal substance in pupillary space; small oblique incision in lower portion of capsule. (To iridectomy downward.)	12/200	
+ inc.	20/50	
c.	20/40	

No. of Catar. B'k	Running No.	Name.	Age.	Date of Extr.	V after Extr.	V before Sec. Op.	Date of Sec. Op.	
2268	62	Richard Wismer	57	Oct. 27, 1897	C. F. 3 ft.	C. F. 10 ft.	Jan. 19, 1898	Patient had prolapse of iris following extra tion. When discharged pupil was still d capsule, to which iris is adherent. Incisi iris drawn out with blunt hook and a pie capsule at lower part of pupil, and capsu pupil.
2335	63	G. Strich	72	Feb. 22, 1898	C. F. 10 ft.	C. F. 15 ft.	Apr. 13, 1898	Fibrous band horizontally above capsule, through capsule, band cut by vertical inc *sion* controlled by pilocarpine. No incre
2327	64	Mrs. Catherine Cochran	60	Feb. 16, 1898	$\frac{20}{200}$	$\frac{20}{200}$	Mar. 26, 1898	1st discission: Capsule moderately thick, but capsule flaps did not keep separated, 2d discission, May 17th, with Schweigger' when pupil is dilated. Lower $\frac{1}{3}$ of capsu blade of forceps scissors was thrust throu opening in upper part of capsule. It wa cut remained open, but upper part unite second operation, V = $\frac{20}{200}$; after second
2266	65	Mary Devany	50	Oct. 23, 1897	C. F. 5 ft.	C. F. 10 ft.	Feb. 28, 1898	Following extraction, next day, prolapse i 1st discission, Feb. 28, 1898. Fibrous depo *Crescentic incision through* capsule at slit-like opening at lower portion of pu same as before secondary operation ($\frac{20}{200}$ 2d discission, May 6th, with Esberg's *for* with lance knife, Esberg's forceps scisso forceps were closed and an opening mad in centre of pupil. V = $\frac{20}{100}$.
2365	66	Maxwell Abernethy	64	Apr. 20, 1898	C. F. 12 ft.	$\frac{15}{200}$	May 26, 1898	During extraction, after lens was deliver *small amount of vitreous.* Iris was healed without reaction; iris drawn up Capsule thick at lower portion; small o Details of fundus seen through clear sp margin of pupil to clear space above. Capsule was thick and tough, and was wi
2362	67	Ann Nolan	65	Apr. 16, 1898	C. F. 19 ft.	C. F. 10 ft.	May 23, 1898	Capsule thick below. Discission with f margin. Incision about 5 *mm* broad. (Schweigger's). Finally succeeding, th capsule, the other above it. With one *scissors* was followed by escape of a d Has extensive *sclero-choroiditis post.*
8264	68	Sarah Love	63			Movements of hand	May 16, 1898	Patient had cataracts removed, both eyes and closure of pupil. An opening was ger's *forceps scissors* were inserted into made in upward and inward direction, small amount of vitreous escaped durin opening in iris enlarged. Discharge inflammation.
2375	69	Mrs. Mary Quick	59	May 9, 1898	$\frac{20}{100}$	$\frac{20}{70}$	June 6, 1898	Discission. Acute glaucoma. Iridector V = $\frac{20}{20}$. Discharged June 23d. Descr
2335	70	Mrs. J. H. Gilette	76	Mar. 22, 1898	$\frac{20}{70}$	$\frac{20}{70}$	May 5, 1898	Simple extraction. Recovery smooth. relief. irido-cyclitis. Discharged Ju Description, see above in text. [See S

Secondary Operation.	V after Sec. Op.	Remarks.
following extraction, which was cut. Muddy exudate in anterior chamber after extrac- pupil was still dull. Operation: *Cyst-iridectomy;* pupillary space filled with thickened dherent. Incision with lance knife, through lower part of cornea and pupillary membrane hook and a piece cut out, producing artificial pupil. The hook pulled iris away from pupil, and capsule retracted after iris was drawn out and cut, leaving quite a nice, central	$\frac{20}{30}$	
above capsule, which was wrinkled above and below the band. T-shaped incision t by vertical incision; large triangular opening in capsule. Apr. 15-25.—*Increased ten-* pine. No increase tension after Apr. 25th, but eye continued congested until May 7th.	$\frac{20}{70}$—	
derately thick, crucial incision. Opening in capsule moderately large after the operation, keep separated, and when patient was discharged the opening was very small. V = $\frac{20}{70}$.		
th Schweigger's *forceps scissors.* Small opening in upper part of capsule can be seen ower $\frac{1}{3}$ of capsule thick. Incision made in lower corneal margin with lance knife; sharp vas thrust through capsule at lower pupillary margin, and pushed under capsule up to the capsule. It was divided with one cut of forceps scissors. May 25th.—Lower portion of pper part united by connective-tissue bands. Opening below this band clear. Before ; after second operation, V = $\frac{20}{70}$ —.	$\frac{20}{70}$	
day, prolapse iris, which was cut.		
Fibrous deposit from organized blood clot in upper part of pupil. Capsule thickened. *gh* capsule at lower part of pupil. Capsule retracted very slightly, leaving a narrow, portion of pupil. V = $\frac{15}{200}$. May 4, 1898.—Opening in capsule has closed, and vision is operation ($\frac{20}{200}$).	$\frac{20}{200}$	
h Esberg's *forceps scissors.* Operation: An opening made in cornea at outer margin forceps scissors inserted, sharp-pointed blade pushed through and behind capsule. The n opening made in the thick capsule. The capsule retracted, leaving a slit-like opening $\frac{20}{100}$.		
ns was delivered, patient squeezed eye, rupturing suspensory ligament, causing loss of *us.* Iris was reduced into anterior chamber by spatula with some difficulty. Wound iris drawn upward and outward, forming pear-shaped pupil.		
tion; small opening in upper part of pupil, which is clear. Small posterior synechia. rough clear space. Operation: *Incision with knife needle* through capsule from lower pace above. Capsular flaps retracted, leaving large opening. gh, and was with some difficulty cut with knife needle. V = $\frac{20}{30}$.	$\frac{20}{30}$	
cission with forceps scissors. Corneal incision with lance knife 2 to 3 *mm* from outer 5 *mm* broad. Aqueous gradually flowed out in attempt to introduce forceps scissors succeeding, the points of forceps were put in pupillary space, one piercing membranous it. With one rapid closure of scissors the membrane was divided. Removal of *forceps* escape of a drop of vitreous. Wound clean, pupil central and clean. V = C. F. 20 ft. *roiditis post.*	$\frac{20}{200}$	
ved, both eyes, several years ago (not by Dr. Knapp). Iris is drawn upward in both eyes n opening was made with lance-shaped knife at outer corneo-scleral junction; Schweig- e inserted into anterior chamber, one blade pushed through iris at outer part. A cut was ard direction, and another *downward and inward*, producing a triangular flap. A very escaped during the operation. The triangular flap of iris and capsule shrank, and the l. Discharged June 23, 1898. Vis. R. E. + 10, C. F. 8 ft. July 10, 1898, $\frac{12}{200}$. No		
na. Iridectomy. Recovery. June 14th.—Wound has healed and patient sees nicely. e 23d. Description above, in text.	$\frac{20}{40}$	
ery smooth. Capsule dotted. Discission. Acute glaucoma. Paracentesis; temporary. ischarged June 4th, counts fingers 6 inches w. + 13 D. Four weeks later $\frac{20}{30}$ − T $\frac{1}{3}$ text. [See Supplementary Note at end of article.]	$\frac{4}{200}$	

One case has been lost, a great calamity indeed, but it is the only case out of many hundreds. If we take large numbers everything will happen. Should it be a reason to give up discission or even to restrict its indications? I think not. It teaches a lesson as to the cause and cure of the experimental glaucoma occurring in aphakial eyes after discission. Does the glaucoma which discission produces in 1–2% of aphakial eyes occur only in eyes predisposed to glaucoma? There is no proof for this supposition. We see it in young and old persons and in all constitutions.

Has the character of the secondary cataract and the manner of attacking it anything to do with its development? I think this is the main factor. Tough capsules are cut with difficulty, often they are not cut at all but torn off the ciliary processes. It is precisely in such cases that others and myself have noticed the setting in of glaucoma. In my experience those operations have shown the greatest reaction —glaucoma and cyclitis—in which I endeavored to cut dense cords or membranes in the region of the extraction-scar, the most vulnerable part of the aphakial eye. I have therefore avoided disturbing the cicatricial tissue in that region. In our case it also was an operation that irritated this region. The needle was swept around the upper part of an opaque capsule. The part through which it passed appeared thin, but nevertheless it seems to have been detached from the ciliary processes. I did not see the line of incision, and in order to obtain a clear pupillary space, I pressed the capsule downward, a procedure frequently resorted to and commonly without bad consequences, but not completely harmless. I find that I obtain the clearest pupil with the least reaction when I make a clean T- or +- shaped incision. This can be done in almost all cases with a perfect knife-needle, by good artificial illumination. I wanted to review historically and critically the different methods of discission, but shall leave that for another occasion. Suffice it to mention that WM. BOWMAN[1] and A. V. GRAEFE[2] have expressed the same views about the occurrence of glaucoma after discission, and have given the same rules of precaution to which more ex-

[1] W. Bowman, Soc. d' Opht., *Hosp. Reports*, vol. iv., pt. 4, pp. 362 etc., 1865.
[2] A. v. Graefe, ARCH. OF OPHTH., Bd. xv., Abth. 3, p. 223, 1869.

tended experience has led me. The method which I have cultivated (T-shaped or crucial incision through the cornea with a sharp and well-proportioned straight knife-needle, without loss of aqueous or vitreous) differs from that of Bowman (comminution of the capsule by a needle entered more peripherally) and from that of Graefe (iridectomy and ripping the thinner part of the capsule) essentially and has, in my opinion, a wide range of application.

As regards the cure of the artificial glaucoma, the above unfortunate case supports my opinion that iridectomy is the most reliable remedy for the artificial as well as for the idiopathic glaucoma.

From the preceding tabular arrangement of the 70 operations we deduce the following results as to the vision obtained.

DISCISSION.

V before sec. oper.	No. of eyes	V after sec. op.
$\frac{20}{40}$	1	$\frac{20}{30}$
"	3	$\frac{20}{30}$
$\frac{20}{50}$	1	$\frac{20}{40}$
"	2	$\frac{20}{60}$
$\frac{20}{70}$ +	1	$\frac{20}{30}$
"	4	$\frac{20}{30}$
"	7	$\frac{20}{40}$
"	2	$\frac{20}{50}$
"	2	$\frac{20}{70}$
"	1	$\frac{4}{200}$
$\frac{20}{100}$	3	$\frac{20}{40}$
"	1	$\frac{20}{50}$
"	3	$\frac{20}{70}$
"	1	$\frac{20}{100}$
$\frac{20}{200}$	4	$\frac{20}{40}$
"	5	$\frac{20}{50}$
"	3	$\frac{20}{70}$
"	1	$\frac{20}{100}$
$\frac{18}{200}$	2	$\frac{20}{40}$
"	1	$\frac{20}{70}$
$\frac{16}{200}$	1	$\frac{20}{60}$
$\frac{15}{200}$	1	$\frac{20}{50}$
$\frac{15}{200}$	1	$\frac{20}{70}$
"	1	$\frac{20}{100}$
"	1	$\frac{20}{200}$
$\frac{12}{200}$	1	$\frac{20}{30}$
"	1	$\frac{20}{40}$
$\frac{10}{200}$	2	$\frac{20}{60}$
$\frac{8}{200}$	2	$\frac{20}{200}$
$\frac{6}{200}$	1	$\frac{20}{70}$
"	1	$\frac{20}{200}$
$\frac{4}{200}$	1	$\frac{20}{40}$
$\frac{1}{200}$	1	$\frac{18}{200}$
$\frac{1}{\infty}$	1	$\frac{12}{200}$

CYST-IRIDECTOMY

$\frac{12}{200}$	1	$\frac{20}{200}$

FORCEPS-SCISSORS OPERATION

$\frac{10}{200}$	1	$\frac{20}{50}$
$\frac{20}{200}$	1	$\frac{20}{70}$
$\frac{10}{200}$	1	$\frac{20}{200}$
$\frac{10}{200}$	1	$\frac{20}{200}$
$\frac{1}{1000}$	1	$\frac{18}{200}$

From the table it follows that, of the 70 cases of opera-

tions for secondary cataract, the vision in 64 was improved, in 5 it remained the same, in 1 it was lost or almost lost.

The large table shows clearly that in many cases the visual power obtained by the first operation declines later, and the loss thus experienced can be more than made good by a subsequent operation. It is a matter of experience that when the secondary operation has once been perfectly recovered from, the visual acuteness does not diminish otherwise than by the natural senile changes in the tunics and refractive media of the eye.

I have, as in former reports, summed up the visual acutenesses before and after the secondary operation in order to *show numerically what has been the average gain in sight obtained through the after-operations.* That this gain is very considerable can be seen by looking over the single cases in the large table. Collectively the gain can be made out by adding the sum of visual acuteness possessed by the 70 eyes before and after the secondary operations, which can easily be done by using the table on page 472.

Before the second operation

there	were	4	eyes	with	S	$\frac{20}{40}$	which	gives	2.00 S
"	"	3	"	"	"	$\frac{20}{50}$	"	"	1.20 "
"	"	17	"	"	"	$\frac{20}{70}$	"	"	5.10 "

and so forth. The visual acutenesses before the secondary operation sum up to *12.47 S.*

After the second operation

there	were	2	eyes	with	S	$\frac{20}{30}$	which	gives	2.00 S
"	"	9	"	"	"	$\frac{20}{30}$	"	"	6.00 "
"	"	18	"	"	"	$\frac{20}{40}$	"	"	9.00 "
"	"	15	"	"	"	$\frac{20}{50}$	"	"	6.00 "

and so forth. The collective visual acuteness of the 70 eyes now sums up to *27.96 S*, which is more than twice the sight they had before the second operation. *The average S before the secondary operation is computed as 0.18 S*, not quite $\frac{1}{5}$.

The average S after the secondary operation is computed as 0.40 $S = \frac{20}{50}$. The gain in acuteness of sight is a little more (0.22 S) than what they had obtained by the first operation

(0.18 S). In my former reports the results in favor of the secondary operations were even greater, but I may mention that in my former secondary operations I never lost an eye, and that in the previous series the gravely complicated cases had been omitted, whereas in the present series one eye was lost by a secondary operation, and all eyes that had been operated on were counted.

SUPPLEMENTARY NOTE.

To-day, Sept. 13, 1898, when I had returned the final proof to the publishing office, Mrs. John J. Gillette, aged seventy-six, whose case is described on pages 467–469 as having lost, or almost lost, her sight by the occurrence of glaucoma after a discission of the capsule, presented herself again with her eye free from inflammation, T and F normal, cornea, iris, and half the pupil clear (the other half being occupied by the dislocated thickened capsule), fundus details visible, though still somewhat veiled, no excavation or other abnormity; showing on cursory examination S $\frac{2}{200}$, reading J. 4. Thus, **her eye is not lost,** but with proper cylindrical correction and complete clearing of the vitreous it promises to obtain $\frac{20}{60}$ or better vision.

ON THE COURSE AND TREATMENT OF SPONTANEOUS DETACHMENT OF THE RETINA.

By Prof. C. HORSTMANN, M.D., Berlin.

Slightly abridged translation by H. Knapp, M.D.

DETACHMENT of the retina is found in $\frac{4}{5}$ per cent. of all eye patients, and in 4.74 per cent. of all the blind. Its chief cause is cyclo-choroiditis with consecutive changes in the vitreous. The retina, in the opinion of the writer, is separated from its support rather by the subretinal choroidal effusion than by the shrinkage of the vitreous and the contraction of cords. Myopic eyes furnish by far the greatest contingent. Nordenson noticed in all the eyes he examined—in Leber's ophthalmological laboratory—a laceration in the detached retina. I find ophthalmoscopically, under full dilatation of the pupil, a laceration of the retina in about one half of the cases. The prognosis is very unfavorable. Recoveries after operative procedures, not infrequently placed on record, are to be accepted with a good deal of reserve, as the majority of such cases have been published too hastily. It can not, however, be doubted that permanent, complete, or more or less complete, recoveries occur both spontaneously and after operations.

From the year 1879 to 1896, 106 cases of spontaneous detachment (59 in men, 47 in women) have come to the notice of the author. In 9 cases the detachment was in both eyes. The intraocular tension was normal in 60 cases, diminished in 46, increased in none. Myopia was present in 84, E. in 6, H. in 2, not to be determined in 14.

Of the 106 cases *35 had been under observation before, during, and years after, the advent of the detachment*, so that their ultimate condition may be considered permanent; in the others the time of observation was not long enough for final judgment.

The *final results of the 35 cases* were:

Spontaneous total recovery	5	cases.
Reattachment, but with a corresponding defect in F...	2	"
Temporary reattachment, but relapse later	2	"
Detachment remaining partial	11	"
Detachment becoming total	15	"

Abridged histories of the five cases ending in spontaneous recovery are as follows:

Case 1.—A girl of seventeen presented herself, 1880, complaining of failure of S in R E during the last days. M 4 D. S, with glasses, $\frac{6}{6}$ L, $\frac{6}{36}$ R. Defect in lower part of F, reaching up to 22° below the point of fix. Tn. The ophthalmoscope revealed a flat detachment in the upper part, occupying $\frac{1}{4}$–$\frac{1}{3}$ of the background. No laceration discovered. Diffuse opacity of the vitreous. Diaphoresis, decubitus, pressure-bandage for five weeks steadily, for six weeks more the same, with interruptions, with — 4 D. S $\frac{6}{9}$. A small crescent, some irregularities of pigmentation at the place of the former detachment. Patient kept under observation sixteen years. Her condition unchanged at last examination in 1895. No defect in F.

Case 2.—A merchant of thirty-four years, M 5.5, both eyes, presented himself March, 1885, complaining of a veil before his right eye, "caused by too much night-work." R S $\frac{6}{18}$; L $\frac{6}{9}$. Tn, both. Moderate opacities of the vitreous, sharply defined crescent of $\frac{2}{3}$ P D. Retina detached on nasal side, about $\frac{2}{3}$ of the fundus, extending up to 15° from p. fix. No laceration discovered. Diaphoretic treatment, with decubitus and pressure-bandage. In three months retina attached again; F entire; S $\frac{6}{12}$–$\frac{6}{9}$. Irregular pigmentation of inner part of fundus. Recovery uninterrupted; verified last in 1896.

Case 3.—D. K., forty-eight years, M 6.0, S $\frac{6}{6}$, regular crescent of $\frac{1}{3}$ P D, in both eyes, complaining for a few days of a cloud before right eye, "caused by prolonged work with microscope." S still $\frac{6}{6}$, but F contracted below and in, up to 7° from p. fix.

Some opacities of vitreous ; detachment of retina up and out of $\frac{1}{3}$ fundus. No discoverable laceration. Tn. In spite of diaphoretic treatment and decubitus, aggravation for three months, with S sunken to $\frac{6}{24}$, but without increase or change of the detached portion of the retina. Under continuation of the above treatment for six months more, the retina became reattached. S $\frac{5}{1.5}$ to $\frac{6}{5}$ and F entire. OSc only some stripes of pigment under the previously detached portion of the retina. This condition is still persisting after eight years.

Case 4.—A girl of eighteen, with M 7.5 D, both eyes, complained, in February, 1891, that the sight of her left eye had become dim during the last four days, preceded by the appearance of sparks two weeks previous. S $\frac{5}{30}$; contraction of F down and out. Tn. Detachment, not quite flat, up and in, occupying $\frac{1}{4}$ of fundus, approaching from 17° up to p. fix. No laceration seen. Under diaphoresis, decubitus, and pressure-bandage no change for two months. S slightly worse. Four months later, under continuation of the same treatment, with several interruptions, improvement : S $\frac{5}{1.5}$; defect in F smaller. After two months more S $\frac{5}{1.5}$; the defect in F disappeared, except a small peripheric strip. OSc no visible detachment, but distinct choroidal changes in the region of the previous detachment. The condition has been unchanged these six years.

Case 5.—January 3, 1893, a government official, aged twenty-five, came complaining of dimness of *left* eye the last four days, preceded by photopsia the week previous. M 6.5 each eye. S, R $\frac{5}{1.5}$, L $\frac{5}{20}$; defect of F in and down, up to 7° from p. fix., floating opacities of vitreous, crescent of $\frac{1}{3}$ P D, flat detachment of retina, up and out ; no laceration. Tn. Diaphoresis, decubitus, pressure-bandage. During the first weeks S sank to $\frac{5}{30}$, without change in retina, then gradual improvement and conspicuous flattening of the detachment. Four months later S was $\frac{5}{10}$; F entire. Fundus, some accumulation of choroidal pigment, but no detachment of retina. This condition the same when patient was last examined, four years later.

A review of these cases, in which the detached retina reattached itself and resumed its function, shows :

1. No prodromic symptoms except photopsia and obscuration of F.

2. The detachment was in the upper part, flat, never

occupied the entire half of the retina, and did not include the yellow spot.

3. A laceration could not be discovered, under dilatation of the pupil by the most attentive search.

4. The subretinal liquid did not sink, but was gradually absorbed, in from two to ten months.

5. The detached portion of the retina resumed its function, but I should mention that it had never been entirely insensible.

6. The patients were mostly young, four from seventeen to twenty-five; one forty-eight years old.

7. They all had a moderately large ($\frac{1}{3}$–$\frac{2}{3}$ P D), rather well-defined crescent, and a moderate degree of M (4.0—7.5).

These **conditions may be of value in framing the prognosis** of a given case of detachment of the retina.

Cases 6 and 7 referred to patients with higher degrees of M, 7 D and 8 D, who showed the same conditions in advent and course of the disease. The detachment in Case 6 was and remained in the lower part until it disappeared; in Case 7 it was on the nasal side, but moved to the lower half until it disappeared. Both retinæ became reattached, the OSc showed choroidal atrophy; the defects in the F persisted.

In Cases 8 and 9 (M 6.5 and 10.0), a part of the retina was detached, but it reattached spontaneously and resumed its function. A few months later the detachment reappeared, became gradually total, and the eyes permanently and totally blind.

Of the 11 patients in whom the detachment was, and remained, partial, one was emmetropic and 10 were myopic (from 2 D to 27 D, in the majority 6 D to 10 D). In 7 the detachment began in the upper outer portion, and slowly, in several months, moved to the lower portion, where it remained. The vision was considerably impaired in all of them, but as the limitation of the detachment has now been observed between three and twelve years in the several cases, it may reasonably be expected that it is not likely to change much further.

Among the 15 cases in which, mostly under the picture of irido-choroiditis with cataract, the *detachment of the retina*

became total, one is particularly to be noted, because the patient, a man of forty-nine, had had, two years before the occurrence of the detachment, a central choroiditis, leaving in *the region of the yellow spot the well-marked changes which are alleged to prevent detachment.*

[The author devotes six pages to the discussion of the causes and the mechanism of detachment of the retina, reviewing the opinions of Heinrich Müller ("Contraction of Cords in the Vitreous," *Arch. für Ophth.*, iv., 1, S. 372, in 1858), A. v. Graefe, Schweigger, Leber, Nordenson, Rælhmann, and Schmidt-Rimpler.]

As to the spontaneous recovery, 5 out of the 35 cases detailed above would give the percentage too great, even if we add that of the remaining 71 information has been received in a large number, showing that none of them was followed by complete recovery.

The operative treatment of detached retina began with SICHEL,[1] who, almost fifty years ago, liberated the subretinal liquid by perforating the sclerotic without injuring the retina. He was followed by KITTEL and ARLT,[2] and later by A. v. GRAEFE.[3] The retina became reattached in many cases, but sooner or later was detached again.

A. v. GRAEFE evacuated the subretinal liquid after incising the sclerotic and discinding the retina. He[4] and BOWMAN[5] have noticed a series of good results from this procedure, but they seem to have been of short duration.

Soon after, unfavorable results of this operation, viz., iritis, cyclitis, intense opacities of the vitreous, causing a partial detachment to become total, were reported by HIRSCHMANN,[6] HASNER,[7] and ARLT.[8] Only exceptionally this operation has been favorably mentioned,[9] which seems to prove that it has been almost entirely abandoned.

[1] *Clinique européenne*, 1859, No. 29.
[2] *Allgemeine Wiener med. Zeitschr.*, 1869, No. 48.
[3] N. v. KRIES: "Über die Behandlung der Netzhautablösung," *Arch. f. Ophth.*, xxiii., 1. S. 249.
[4] *Zeh. klin. Monatsbl.*, 1866, S. 241.
[5] *Ophth. Hosp. Rep.*, iv., 2, p. 133.
[6] *Zeh. klin. Monatsbl.*, iv., S. 229, 1866.
[7] *Prag. med. Vierteljahresschr.*, xciii., S. 75.
[8] "Operations lehre," Graefe-Sämisch *Handb.*, Bd. iii., S. 373.
[9] J. HIRSCHBERG, "Zur operativen Behandlung der Netzhautablösung," *Centralbl. f. pract. Aug.*, 1891, S. 294.

GALEZOWSKI,[1] BETTREMIEUX,[2] BOUCHERON,[3] and DRANSART[4] report favorably on the effect of iridectomy in the treatment of retinal detachment.

DE WECKER recommended, in 1876, to drain the eye by a loop of gold wire passed through the sclerotic in the vicinity of the detached retina. The result was illusory. The experiment only proves that sometimes the eye may tolerate a gold wire for a while.[5] Occasionally, however, it induces purulent choroiditis and sympathetic ophthalmia.[6] The irrationality of this experiment is obvious, for the wire will, by irritation and inflammation of the choroid and vitreous, tend to produce the primary causes of the detachment of the retina.

Still more extraordinary is the proposition of GALEZOWSKI,[7] to stitch the detached retina with a catgut thread to the choroid and sclerotic.

Another experiment of GALEZOWSKI[8] (1872) was to cure detachment of the retina by injecting tincture of iodine between choroid and retina. SCHÖLER,[9] an adherent to the theory of retraction, has revived this procedure. At first, more or less favorable results were reported by SCHÖLER himself, by ABADIE,[10] COFLER,[11] and LIEBKNECHT,[12] but the bad results were so overwhelming that this mode of treatment is now completely abandoned, even by its originator.[13] GELPE[14] noticed, after an injection of only three drops of tincture of iodine, the occurrence of purulent choroiditis; BULL,[15] the same effect in two out of five cases thus treated; WEBSTER[16]

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[1] *Recueil d'opht.*, 1876, p. 51.
[2] *Arch. d'opht.*, vi., 459, and viii., p. 43.
[3] *Ibid.*, xiii., p. 87.
[4] *Annal. d'ocul.*, xcii., p. 30.
[5] Comp. COHN, *Deutsch. med. Woch.*, 1877, Nos. 32 and 33.
[6] Comp. JUST, *Zeh. klin. Monatsbl.*, xv., S. 355; and HIGGINS, *Med. Journ. and Gazette*, 1879, S. 476.
[7] *Recueil d'opht.*, 1890, p. 1.
[8] *Journ. d'opht.*, i., pp. 27 and 31.
[9] *Zur operativen Behandlung u. Heilung der Netzhautablösung*, Berlin, 1888.
[10] "Traitement du décollement de la rétine," *Annal. d'Ocul.*, cii., p. 203.
[11] *Annali. di Ottalm.*, xix., p. 473.
[12] *Münchener med. Woch.*, 1891, S. 258.
[13] *Berl. klin. Woch.*, 1890, Nos. 34 and 35.
[14] *Centrabl. f. pr. Aug.*, 1889, S. 260.
[15] *Trans. Am. Ophth. Soc.*, 1891, S. 30.
[16] *N. Y. Med. Review*, March 21, 1891.

noticed no essential improvement, neither did BADUEL,[1] SCHEFFELS,[2] and many others.

SCHWEIGGER, who has used SCHÖLER'S treatment in 28 cases, kindly put the notes at the disposition of the author. There were 4 temporary improvements, in all other cases considerable deterioration: partial detachments became total; thick and extensive cord-like and membranous opacities in the vitreous; iritis, even corneal opacities. Lugol's solution produced no better results.

W. WOLF,[3] at the suggestion of KUHNT, injected tincture of iodine into the vitreous of dogs. The invariable result was shrinkage of the vitreous and detachment of the retina, but no laceration.

H. PAGENSTECHER[4] tried to limit the detachment by multiple punctures through sclera, choroid, and retina with a fine grooved needle along the border of the detached portion.

Galvano-cautery has been tried by CHEVALLEREAU,[5] BOURGEOIS,[6] DOR,[7] and others.

All these modes of treatment must be condemned as producing inflammation of the choroid, the chief cause of detachment.

It should still be mentioned that TERSON,[8] SIMI,[9] and SCHÖLER[10] have tried to cure flat detachments of the retina by electrolysis. SIMI has noticed marked symptoms of irritation from this treatment.

In the year 1895 a new mode of curing detachment of the retina was introduced by DEUTSCHMANN.[11] Adopting the theory of retraction, he divided, in 11 cases, the connecting cords between the retina and the shrinking vitreous, and thoroughly let out the subretinal liquid. He thrust a nar-

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[1] *Riforma Medica*, viii., No. 114.
[2] "Heilung kurzsichtiger Netzhautablösung," *Festschrift 50th Jubilee Düsseldorf Med. Soc.*, 1894, S. 261.
[3] *Graefe's Arch. f. Ophth.*, xl., 2, S. 63.
[4] Comp. SCHEFFELS, *l. c.*
[5] *Rev. générale d'ophth.*, 1892, No. 5.
[6] *Trait. du décollement de la rétine*, Reims, 1892.
[7] *Annal. d'ocul.*, cxv., 3, p. 458.
[8] *Annal. d'ocul.*, cxiv., p. 22.
[9] *Bolletino d'ocul.*, xvii.
[10] *Zeh. klin. Monatsbl.*, 1893, S. 215.
[11] DEUTSCHMANN, *Beiträge zur Augenheilkunde*, xx., S. 1.

row knife, sharp on both edges, as peripherally as possible through sclerotic, choroid, and retina into the vitreous cavity, advanced it somewhat obliquely to the opposite wall, and in slowly withdrawing it gently cut the vitreous on both sides. In some cases he perforated the sclerotic with the galvano-cautery prior to discinding the retina and vitreous.

This operation proving unsuccessful in a series of cases, DEUTSCHMANN *originated the following mode of treatment:* A two-edged narrow knife is thrust through sclera, choroid, and retina into the vitreous as above, dividing cords and liberating liquid from before and behind the retina. The vitreous of a rabbit's eye, diluted with a few drops of a 7:1000 solution of chloride of sodium, was triturated. Of this liquid a few drops were injected with a hypodermic syringe into the vitreous cavity of the eye of the patient. By this procedure the retina was intended to be pressed permanently against the choroid until the ensuing uveitis had the established agglutination of the retina to the choroid.

SECONDI[1] also has perforated the posterior membranes of the eye with a double-edged needle and discinded the vitreous, and afterward made a subconjunctival injection of bichloride of mercury. He alleges to have had four permanent recoveries by this method.

IUTRZENKA[2] reports on 10 cases of detachment of the retina operated on according to DEUTSCHMANN. In one case vitreous from a rabbit's eye had been injected. The result was total detachment of the retina and amaurosis. In all the other cases single or repeated discissions of the retina and vitreous had been made. A sure and lasting recovery cannot be warranted.

Deutschmann's method cannot be considered as harmless, in spite of good results reported by its originator. It deals too freely with the vitreous. Penetrating wounds of the vitreous, as is well known, may lead to detachment of the retina after a period of quiescence of months or years. The author can illustrate this fact by two simple and perfectly successful operations with Hirschberg's magnet, which

[1] *Annali di Ottalm.*, XXV., 4, p. 352.
[2] *Wiener med. Woch.*, 1897, No. 20.

healed without any reaction and perfect sight until respectively five and seven months later, when detachment of the retina, starting from the wound, made its appearance, and became total within eighteen to twenty-four months. That even simple divisions of the vitreous are dangerous is illustrated by some cases of DEUTSCHMANN[1] himself.

The author cannot but concur with SCHMIDT-RIMPLER that the results reported by DEUTSCHMANN, though surprising, cannot shake his opinion that the retina is detached by exudation from the choroid. Thus far SAMELSOHN'S[2] proposition, to treat detachment of the retina by diaphoresis, decubitus, and pressure-bandage for three or four weeks (or longer), promises the best results. All operative methods of treatment that have hitherto been tried are to be deprecated. Those implicating the retina and vitreous are most fraught with danger, whereas paracentesis of the subretinal space by a puncture of the sclerotic and choroid is least prejudicial. The prophylactic and curative treatment of the primary difficulty, the uveitis, remains of paramount importance.

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[1] See *l. c.*, p. 35.
[2] *Centralblatt für die med. Wissenschaften*, 1875, No. 49.

TWO DISEASES RELATED TO RETINITIS PIGMENTOSA: RETINITIS PUNCTATA ALBESCENS AND ATROPHIA GYRATA CHORIOIDEÆ ET RETINÆ.

By Professor E. FUCHS, Vienna.

Translated by C. W. Cutler, M.D., New York.

(*With two figures on Plate A, of Vol. XXXII., German Edition.*)

At the session of August 5, 1895, of the Ophthalmological Society at Heidelberg, I described a peculiar disease of the retina and choroid and demonstrated drawings. Since no trace of this paper appeared in the report of the Society, I take the liberty of recurring again to the same subject.

We have learned that the disease known as retinitis pigmentosa is an insidious atrophy of the retina whose cause is to be sought less in the retina itself than in the choroid which nourishes the retina. This assumption, which has been often expressed, has become extremely probable through the experiments of Wagenmann. The pigmentation, which is the most frequent and striking ophthalmoscopic sign, plays, in fact, but a secondary part. The characteristic features of this chronic atrophy of the retina are:

1. The hereditary nature of the disease and its occurrence in families.
2. Its commencement in childhood or youth.
3. Its slow but uninterrupted progress.
4. The first subjective symptom, night-blindness.
5. The most important ophthalmoscopic sign, atrophy of

the retina, which is recognized by the thinning of the retinal blood-vessels and consecutive atrophy of the optic nerve.

The ophthalmoscopic picture which diseases of this class may show is not always the same; most frequently it is that of typical retinitis pigmentosa, but cases of atypical retinitis pigmentosa are relatively frequent, among which belong some which have the ophthalmoscopic appearance of a retino-choroiditis. In addition, retinitis pigmentosa sine pigmento must be mentioned. CUTLER [1] has collected the cases of this nature which have appeared in the literature. Finally, retinitis punctata albescens should be placed in this class as I have shown.[2] All cases which have been described under this name, however, do not belong here, as the most varied conditions have been reported under this title if only white points were to be seen in the retina. It would be suitable, therefore, to confine this name in future to such cases as have, in addition to the white points, certain clinical features in common. These are: the existence of the disease in childhood, and, as a rule, in several members of the same family; blood-relationship of the parents; diminution of direct vision and marked concentric narrowing of the field of vision, and finally, night-blindness existing since childhood. Cases of this kind, up to the time of my paper above mentioned, have been reported by GAYET, NETTLESHIP, LANG, and GUNN. Since then two have been added, one by OLE BULL [3] and one by KRIENES,[4] both of which cases, however, have been briefly reported and not fully described. To these cases of retinitis punctata albescens I can add another, which has been under my own observation.

The patient is a twelve-year-old boy, who is otherwise healthy and whose parents are related by blood (marriage between nephew and aunt). He is the only member of the family who has disease of the eyes, and has not been able since his sixth year to find his way about alone in the evening. The central

[1] ARCH. OF OPHTHAL., vol. xxiv., No. 3, 1895.
[2] *Arch. f. Ophthal.*, 39 Bd., 3. Abth., p. 65.
[3] *Perimetrie*, Bonn, 1895, p. 65.
[4] *Ueber Hemeralopie*, 1896, p. 54.

vision is normal, but there is marked concentric narrowing of the field. The boy has black hair and brown irides; the eyes are normal externally, the media transparent, and the fundus normal except for the white dots; as yet the papilla and the retinal vessels show no change. The fundus is sown with little white dots, the smallest of which are just visible, while the largest have about the diameter of a retinal vessel of the second order. They are all pure white, sharply limited, and without pigment at their margins. They lie often in groups of two or three together, and are in places arranged in rows which correspond to the direction of the fibres of the innermost layer of the retina. The dots are most numerous around the papilla and around the macula lutea. Corresponding to the macula itself, however, is an area of about two papilla-diameters which is entirely free from spots, as is also the periphery of the fundus.

Another type of chronic retinal degeneration is that to which I would like to give the name of *Atrophia gyrata chorioideæ et retinæ*. Up to the present time I have seen only four cases of this disease. The first three were sisters, whose parents were first cousins. They became night-blind at an early age, and are already partly blind. These cases were in my private practice, and Dr. CUTLER[1] has reported them from my notes. For the history, I would refer the reader to that article, and will only add the ophthalmoscopic picture of the oldest of these patients, which Dr. SALZMANN has sketched, because it is more exact than the sketches in the former article, and because it serves to explain what I shall say later concerning this disease. Soon after the appearance of CUTLER'S paper, I saw a fourth case of the same disease.

The patient was a man, twenty-nine years of age, whose parents were healthy and were not related by blood, and who was the only member of his family with disease of the eyes. He was night-blind in childhood, and of late years the vision by daylight has diminished. The vision is now $\frac{5}{36}$, with myopia of 6 D. The fields of vision are so much narrowed that they have a diameter of only a few degrees. In other respects the patient has good health. The hair is dark and the iris grayish-brown. The con-

[1] ARCH. OF OPHTHAL., vol. xxiv., No. 3, 1895.

dition of both eyes is nearly the same, except that on the right side there is a slight congenital ptosis and the remains of the hyaloid artery. In both lenses there is the typical star-shaped posterior cortical opacity. The appearance of the fundus of the right eye, in the inverted image, is shown in Fig. 2, Plate A. This picture was completed from memory, after a sketch by Dr. Salzmann, who had seen the case himself, and is therefore, in general, correct, although not true to nature in all its details. The papilla has the same appearance as in retinitis pigmentosa; the retinal vessels are so narrow that they are almost invisible. At the temporal edge of the papilla there is a rather large staphyloma. Papilla and staphyloma are surrounded by a zone of normally colored fundus which is everywhere remarkably narrow. In the region of the macula there is an island of normal fundus, about the size of the papilla.

Peripherally from the narrow, normally colored zone lies the atrophic area, in which are seen a few choroidal vessels on the white ground of the sclera. Within this zone there are a few small islands of normal appearance, which are joined to each other by long, narrow bridges. These appear very dark by contrast with their surroundings, and in places almost black. The position and form of these islands and the bridges which unite them, show plainly the nature of their occurrence: they are the last remains of normal fundus left between the atrophic areas. These first occurred in the form of round spaces which were arranged in zones concentrically about the papilla, and which have gradually so increased in size that they are now nearly in contact, and in this process they have become flattened, so that those which were originally round have assumed a more polygonal form. In the white, atrophic parts of the fundus are flecks of black pigment, which are small in the neighborhood of the papilla and become larger towards the periphery; here they are large, pitch-black, and of coarsely polygonal form; quite different then, from those seen in retinitis pigmentosa. The diseased posterior portion of the fundus is separated by sharply cut edges from the extreme periphery, which has a normal appearance.

A case which surely belonged to this class was reported by JACOBSON[1] in 1888. From this case, and from the four

[1] *Klin. Monatsbl. f. Augenheilk.*, 1888, p. 202. Whether a case reported by Mauthner as choroideremie (quoted at length by Cutler) belongs also to this group is not certain.

that I have seen, the following clinical picture may be drawn.

The disease is apt to occur in several members of the same family, either handed down or in the same generation, and at times in children whose parents are related by blood. It begins in childhood with night-blindness. The ophthalmoscope shows signs of atrophy of the papilla, retina, and choroid. The papilla has the same appearance as in retinitis pigmentosa, and the atrophy of the retina is shown by the narrowing of its vessels. *The characteristic feature of the disease lies in the peculiar form of choroidal atrophy.* This occurs first discreetly, in the form of round, sharply margined, bright dots, which increase in size until they become confluent. They now melt completely into one another, or remain divided by small strips of normally colored fundus. Over the atrophic areas a few choroidal vessels and pigment flecks are to be seen. The atrophy then involves both the pigment epithelium and the stroma of the choroid; that of the first is complete; the latter has vanished to a great extent. The atrophic spots lie in a zone having the papilla for centre, and extending from the equator nearly to this point. Thus the papilla is surrounded by a broad white girdle, from which it is separated by a band of normally colored fundus. The edge of the girdle which lies towards the papilla is scalloped, because the separate, rounded parts of which it is composed extend backwards varying distances, while the remains of the normal fundus project forwards between them in sharp processes. This lobulated edge of the white zone is sharp, and in places is brought into greater relief by a narrow pigment margin. The longer the disease lasts the nearer this zone approaches the papilla, thus narrowing more and more the area of normal fundus, until finally only a slender ring remains around the papilla; in addition to this, an island of normal fundus, somewhat larger, may be preserved in the region of the macula.

The normal zone will sometimes be still farther diminished by the occurrence of an atrophy around the papilla, either in the form of the familiar staphyloma or like the

lobulated white areas, which finally unite with the broad white zone. While the atrophic zone is sharply limited posteriorly, anteriorly the pigment flecks become more and more numerous, until the fundus in the extreme periphery may appear almost black. In my last case there appeared to be normal fundus still farther towards the periphery. The opacity of the posterior cortical layers of the lens is to be mentioned as existing in all cases so far observed; it is the same kind of star-shaped, posterior cortical cataract that occurs in retinitis pigmentosa.

Atrophia gyrata chorioideæ et retinæ is differentiated from retinitis pigmentosa by the prominence of the choroidal atrophy, which dominates the ophthalmoscopic picture. The appearance of the atrophy in the shape of round spots, constantly increasing in size, suggests that it starts in the middle of an area supplied by a single vessel, and advances towards its periphery. It is known that the smallest arteries of the choroid which pass from the middle vessels to the capillary layer divide here into numerous radiating capillaries. It is possible that these groups of capillaries may have a part to play in this disease. In any case, this disease seems to demonstrate that chronic degeneration of the retina in general, the different forms of which I have just dealt with, is preceded by a primary disease of the choroid.

ON OCULAR AFFECTIONS IN PUERPERAL ECLAMPSIA.[1]

By C. ZIMMERMANN, M.D., Milwaukee, Wis.

IN the text-books of ophthalmology and obstetrics, or in the treatises on the relation of ophthalmic to general diseases, no information is given on ocular affections in puerperal eclampsia. That they occur ZWEIFEL (*C. Bl. f. Gyn.*, 1895, p. 1206) shows in the reports of his 129 cases of eclampsia, tabulated in order to give exact information on all conditions observed in this affection. He devotes a special paragraph to the question: Blindness, yes or no? I therefore perused the incident literature of the last two decennia, as far as accessible to me, of which I shall in the following give a résumé in connection with the report of a case which, on March 2, 1895, I saw in consultation with the late Dr. J. MENDEL, who kindly gave me the clinical history.

A woman, aged thirty-eight, for the second time pregnant, had the first eclamptic attack in the fifth month of gravidity in August, 1894. This was followed by eight fits on the same day, which were stopped by chloroform. Urine 100 *ccm* in twenty-four hours. Albuminuria. The patient was kept in bed for four weeks under milk diet, after which the urine became normal.

In October, 1894, six new attacks occurred. Her general condition became impaired, and gradually mental changes developed. The patient was not quite clear in her mind, was ill-humored upon questions, her memory impaired; she was apathetic and unable to walk. Her face was swollen and cyanotic. Urine 750 *ccm* per day.

[1] Abridged from a paper read before the Wisconsin State Medical Society at Milwaukee, May 6, 1898.

December 24th she was delivered of a healthy, strong boy; no eclampsia during labor, which was normal.

On the fourth day of confinement three attacks of eclampsia occurred, and on the eighth, thirteen. Urine contained some albumen. Her mind became more disturbed; apathy, loss of memory. On February 2, 1895, urine 1000 to 1500 *ccm;* no albumen. She complained of various ailments, as weakness of left side of body, numbness of tongue, but no actual paralysis could be ascertained. February 15th twenty more attacks followed. As she then complained of her sight, I was called in consultation on March 2, 1895, and found high myopia, staphyloma posticum, otherwise the fundus of both eyes normal. Vision not worse than formerly. Visual field of left eye contracted upwards and towards the temple; not of the right eye. Left pupil a little smaller than right, pupillary reaction normal in both. No more eclamptic attacks occurred, but the patient became more and more apathetic and stupid. Sudden death May 21, 1895.

At the *post-mortem* examination I found a large focus of white softening of the left occipital lobe at the floor of the posterior horn of the left lateral ventricle. Microscopically it was gelatinous and contained detritus, corpora amylacea, and many fine blood-vessels with aneurisma-like sacciform appendices filled with red blood-corpuscles. Blood-vessels at the base did not reveal any changes nor was there any embolism or thrombosis in the larger branches.

An *eclamptic* attack closely resembles an *epileptic* seizure, from which, however, it is distinguished by its occurrence in pregnancy, or the puerperal state, and, as well as from convulsions through other causes, by the characteristic frequency and accumulation of the fits. Like the epileptic attack, it is initiated by *dilatation and reflex immobility of the pupils* to light. This has been supposed, as the loss of consciousness does, to allow a distinction of eclamptic and epileptic from *hysteric* convulsions, but has lost its importance as a symptom of differential diagnosis, since recently KARPLUS, NONNE, BESELIN, HITZIG (*Berl. Klin. Woch.*, 1897, No. 7), and A. WESTPHAL (*ibid.*, Nos. 47 and 48), published cases of hysteria in which the pupils were either dilated or myotic, but immovable during the seizures. WESTPHAL inclines to

attribute this occurrence in hysteria to central (cortical) conditions of irritation or paralysis.

In comparing *eclamptic* with *uremic* convulsions authors widely differ. Some consider both kinds as identical, others as different affections. And as uremia is only observed in nephritis, the former attribute the cause of eclampsia also to nephritis. CROSTI (*Jahresbericht d. Gyn.*, 1896, p. 708) calls the physiological albuminuria of gravidity a hyperfunctional albuminuria, and concludes from statistics that eclampsia is due to a disturbed function of the kidneys, and is nothing else but a variety of acute uremia. Others, however, urge, as for instance SCHAUTA (*Lehrb. d. ges. Gynækologie*, 1896), that in a large proportion of cases of eclampsia no lesions of the kidneys are found, and in cases of albuminuria the eclamptic disturbances are slight and transient, and finally that eclampsia is scarcely observed in severe cases of parenchymatous nephritis. Therefore, he considers the occurrence of renal affections in many cases of eclampsia rather as a secondary disease caused by toxines. PRUTZ (*Deutsche Med. Woch.*, 1897, No. 40; *Vereinsbeil.*, No. 26), reported of 500 cases of eclampsia, collected from literature, 46 per cent. nephritis, 11.6 per cent. chronic inflammatory processes, but esteems the renal affections rather as secondary than as the anatomical cause of eclampsia. According to CHARLES (*Congrès internat. de Genève*, 1896), who also takes albuminuria as an accompanying symptom of eclampsia, one case of eclampsia occurs in four cases of albuminuria, whereas FEHLING (*C. Bl. f. Gyn.*, 1893, p. 998) found the latter in 98 per cent. Probably albuminuria in eclampsia is a functional albuminuria, as very recently described by PRAETORIUS (*Berl. Klin. W.*, 1898, p. 312), caused by endogenous toxines from insufficient assimilation of nitrogenous metabolic substances (obesity, gout, diabetes) or muscular exertions, under which head convulsions must be classed.

As in uremia, the *visual disturbances* observed in eclampsia are also of *cerebral character*, if we exclude the occasional hemorrhages and albuminuric affections of the retina (Herman, *C. Bl. f. Gyn.*, 1893, p. 220). The *lesions of the brain*

ascertained in *post-mortem* examinations of eclamptic persons were: Hemorrhages of the meninges, cortex, and central ganglia, embolism, thrombosis, secondary softening, and œdema. The hemorrhages varied from microscopical size to very large apoplectic foci, and frequently caused death (Leopold, *C. Bl. Gyn.*, 1885, p. 43; Vincent, 1889, p. 302; Strack, 1890, p. 53; P. Müller, 1891; Loehlein, Herzfeld, Chrobak, Gerdes, Goldberg, Lubarsch, Pfannenstiel, Leusden, Schwab, Prutz). SCHMORL (*C. Bl. Gyn.*, 1891, p. 210) invariably detected them around thrombosed veins and capillaries, and within the circulation large multinuclear cells, which he claims to be placentar giant-cells. Thus, according to him, all pathological conditions of the organs found in eclampsia are produced by the coagulating effect of the placentar cells introduced into circulation upon the blood, or through other material from the diseased placenta which enters circulation with the same effect. VICARELLI (*C. Bl. Gyn.*, 1896, p. 1027) observed in two cases of eclampsia thrombosis of the blood-vessels of the brain, caused by peculiar hyaline globules, which had anatomical and chemical identity with those found by various authors in infectious diseases of man, as well as in animals which had been experimentally infected.

ZWEIFEL thinks that the cerebral apoplexies in eclampsia are no complication, but an essential feature of eclampsia, illustrating the increased pressure in the cerebral vessels, which is so immense that even the elastic blood-vessels of young individuals are ruptured. As a proof of this increased tension he mentions the therapeutic effect of venesection in such cases by reducing the blood-pressure. This has actually been confirmed by BALLANTYNE (*C. Bl. Gyn.*, 1886, p. 239), who measured the arterial tension in puerperal eclampsia with the sphygmograph, and found it enormously increased during the convulsions.

Although ZWEIFEL (p. 1206) asserts that as yet no pathologist has in cases of apoplexy in eclampsia found capillary aneurisms or changes of the cerebral vascular coats which might be attributed to nephritis, but multiple obstructions of the vessels of the brain, there are a few such observa-

tions: MASSEN, *e. g.* (*C. Bl. f. Gyn.*, 1893, p. 320), saw ectasiæ of the smallest blood-vessels of the brain. PFANNENSTIEL (*C. Bl. Gyn.*, 1887, No. 38) reported a case of fatal hemorrhage from rupture of a varix of the size of a cherry-stone in the left thalamus opticus, brought about by the increased blood-pressure due to eclamptic convulsions. BOUFFE DE SAINT-BLAISE (*C. Bl. Gyn.*, 1893, p. 913) describes a similar condition in the liver, viz., varicose dilatations of the blood-vessels, and diffused hemorrhagic foci in all his thirty-one autopsies of eclampsia. The focus of softening in our case also contained numerous small blood-vessels, which under the microscope showed very large *sacciform aneurisma-like ectasiæ*, filled with blood-corpuscles.

In other cases the cerebral apoplexy was found in connection with atheroma of the arteries (Davis, *C. Bl. Gyn.*, 1891, p. 776; Raymond, Rose, *Berl. Klin. Woch.*, 1898, p. 193).

If such anatomical changes of the blood-vessels exist, the more readily they will give way to the increased blood-pressure caused by the convulsions, hence the numerous and large hemorrhages in such cases.

In regard to the *etiology* of these changes found in eclampsia, so many theories have been advanced, that ZWEIFEL called eclampsia "the disease of theories." The microscopical conditions of the various organs in eclampsia bear a remarkable resemblance to those found in acute intoxications, as, for instance, yellow atrophy of the liver, multiple subcutaneous ecchymoses, etc. (Ahlfeld, Klebs, Stumpf), and chemical and experimental investigations of the last few years have rendered it most probable that eclampsia is due to an auto-intoxication of the whole organism.

The genesis of the poison lies, according to KOLLMANN, in a transportation of waste products of fœtal metabolism into the maternal blood, and by mechanical and nephritic disturbances their further metamorphosis is arrested. Delivery of the fœtus and the beneficial effect of venesection corroborate this assumption, as after the latter the lost quantity of blood is made up by absorption of water, so that the blood is purified from the obnoxious substances and more diluted.

The occurrence of eclampsia during *puerperium* is explained by the disturbance of metabolism not having yet subsided, and this is strengthened by the dependence of the prognosis of eclampsia after delivery upon the diuresis.

To the action of the eclamptic poison the hemorrhages, thrombosis, and embolisms found in the brain have to be attributed, as it causes frailty of the vascular coats, which, yielding under the blood-pressure, become extended into ectasiæ and burst, produces spasms of the blood-vessels, and favors the coagulation of fibrine. If the resultant affections of the brain are not directly fatal, various brain symptoms may be observed, as hemiplegia (Schwab), aphasia (Brooks, Rose, Baginsky), loss of memory (Schwab, Geyl, our case) psychoses (Olshausen, Hoppe, Knapp, Senlecq, Schauta), and *visual disturbances*, as *contractions of the visual field*, *hemianopia*, *amblyopia*, and *amaurosis*. If in a case of eclampsia with albuminuria and suppression of urine-excretion such ocular symptoms occur, they might be attributed to the uremic as well as to the eclamptic poisons, although different, but similar in action. In such cases, however, it must not be forgotten that the albuminuria usually is a *secondary* affection, accompanying pregnancy, which after delivery entirely subsides, as in our case, in which eclamptic convulsions occurred in the puerperium, but the urine remained free of albumen, so that uremic poisoning can safely be excluded.

It has been supposed that the uremic or eclamptic poison acts directly on the ganglion cells of the cortical visual centres, or by ischemia, hyperemia, or local œdema. LEHMANN (*Berl. Klin. W.*, 1896, p. 1134) for instance, in describing a case of hemianopia in puerperal eclampsia, asserts that never a macroscopic condition has been found in autopsies which could explain the functional disturbances of sight. Other cases of hemianopia and contractions of the field of vision and attributed to uremia have been observed by PICK, SCHMIDT, DUNNIN, and one of hemianopia inferior, also with contraction of the upper portion of the visual field in an eclamptic woman in which mind-blindness developed (*C. Bl. f. A.*, 1888, p. 411). According to PICK (*C. Bl. f. i. Med.*, 1896,

p. 352) the uremic amaurosis is due to a toxic paralysis of both central optic paths. From some reason or other the one hemisphere may be more damaged than the other, so that, after the subsidence of amaurosis, hemianopia remains. An analogue for this is the occurrence of uremic (motor) hemiplegia. In one of his cases of hemianopia he found a focus of softening in the cortex of the right second occipital convolution which was not caused by embolism. Therefore, he thinks that the uremia may exert a toxic influence on the vasomotors of the brain causing necrosis of that portion, or thrombosis of a vessel with consecutive softening. In favor of this he quotes the analogous action of some poisons and the fact that after uremic amaurosis lasting impairment of sight may persist which can only have been produced by a cerebral lesion. In a similar manner SCHANZ (*D. Med. W.*, 1896, No. 28) explains the transient amaurosis in pregnancy, and HEINZEL (*Deutschmann's Beitr. z. Aug.*, Vol. ii., p. 235) the visual disturbances in the period of lactation, as neuritis caused by intoxication by toxic albuminous matter, as well as EULENBURG other neuroses, *e. g.*, vomiting, in pregnancy. But the almost constant anatomo-pathological condition of the brain found in autopsies of eclamptics, as mentioned above, renders it much more probable that the poison acts by the changes of the blood and the blood-vessels which it produces and their sequels, the convulsions being the direct cause of the hemorrhages.

To be sure, in our case the large focus of softening in the left occipital lobe could not explain the contraction of the visual field of the left eye outwards and upwards and the weakness in the left half of the body, but only one examination of the eyes had been made, so that by further tests probably more distinct symptoms might have been ascertained. The contraction of the visual field in our case I would rather explain as analogous to that found by CHARCOT and WILBRAND (*Ueber Sehstoerungen bei functionellen Nervenleiden*, 1892, p. 26) after hysteric, epileptic, or hystero-epileptic seizures which are followed by psychical alterations; or as in other neuroses, in neurasthenia, chorea, melancholia, or in nervous asthenopia after exhausting diseases, especially

severe confinements; or finally it may be attributed to the commotion of the brain owing to the convulsions. Attention has been called by WILBRAND to the fact, that an especial search has to be made in cases of suspected hemianopia, to really ascertain its existence as such patients generally are very listless and tire easily. Our patient was in such a condition that she had lost her memory and had become rather stupid, but the visual field of the right eye was normal and that of the left showed only the contraction mentioned.

The question arises, could we, from the anatomical condition of the left occipital lobe, have expected hemianopia in this case, since the age of the focus of softening indicated that it must have existed at the time of the examination? I think not. And in that respect the case is rather interesting as to the determination of the visual centre. The focus was confined to the floor of the posteriorhorn of the left lateral ventricle in the occipital lobe. It did not spread laterally towards the radiation of the fibres of Gratiolet, but downward towards the lingual and fusiform lobes which, according to NOTHNAGEL (*C. Bl. f. A.*, 1888, p. 481), as well as the middle and inferior occipital gyri, have nothing to do with the visual centre. The cortex of the occipital lobe was not affected, especially not the cuneus and the region around the fissura calcarina. Thus, although in the occipital lobe, it did not involve the visual centre. In contradistinction an analogous case of right hemianopia in the lower quadrant observed by ANDERSON (*C. Bl. f. A.*, 1889, p. 386) may be mentioned, in which a hemorrhage was found in the posterior horn of the left lateral ventricle, but with sanguinolent imbibition and softening of the surrounding lateral tissue and the angular gyrus as far as its cortex. A case of nephritis reported by BOUVERET (*C. Bl. A.*, 1887, p. 381) also belongs here in which sudden total amaurosis was caused by two symmetrical foci of softening of the medial and posterior surface of both occipital lobes corresponding to Munk's visual centre, probably due to embolism. P. MÜLLER (*C. Bl. Gyn.*, 1891) found in a woman who died of eclamptic convulsions a hemorrhage covering the whole pons and another one at the right Sylvian

fossa. The posterior portion of the left lateral ventricle was transformed into a cavity the size of a small apple, filled with cruor. · The borders of the cavity, extending into the cortex of the parietal and occipital lobes, consisted of lacerated tissue infiltrated with blood.

These anatomical changes of the brain in eclampsia show how important it is in such cases to make a very careful examination of the eyes, especially the visual field.

To sum up: In eclampsia we find chemical alterations of the blood and anatomical changes of the blood-vessels, which we have to attribute to auto-intoxication with globulines or products of regressive metamorphosis of albuminous metabolism from the maternal and fœtal cells. The convulsions, owing to irritation of the convulsion-centres by these substances, produce commotion of the brain, increase the blood-pressure leading to rupture of blood-vessels as well, as the auto-intoxication, by creating a tendency to coagulate the fibrine of the blood which entails thrombosis and embolism. The ensuing hemorrhages, foci of softening, and necrosis of brain-tissue give rise to hemiplegia, aphasia, psychoses and, when involving the optic path, to visual disturbances, as amaurosis, amblyopia, hemianopia and contraction of the visual field.

A CASE OF OSSIFICATION OF THE LENS.

CLINICAL HISTORY BY DR. JOHN DUNN, PATHOLOGICAL REPORT BY DR. WARD A. HOLDEN.

(*With one figure.*)

Clinical.—In February or March, 1898, Mrs. H. brought to me her son, aged nine. His right eye was totally blind, somewhat shrunken, and the seat of an active and very painful cyclitis. The pupil was immovable; the fundus could not be made out. The left eye was watery and abnormally sensitive to the light. The right eye was removed, and after removal was opened to see if it contained a foreign body. None was found. The lens, however, was found to be solid, and to the touch resembled bone. The iris was adherent over the whole anterior surface. The diagnosis, ossification of the lens, was made, and the lens was sent to Dr. Ward A. Holden for examination. Unfortunately the diagnosis was not made until after the eyeball had been opened, the lens shelled out, and the rest of the ball thrown away. There was, however, no visible indication of ossification of the choroid.

The child's mother, a fairly intelligent woman, gave the following history of the trouble in the right eye: One afternoon, when the child was three years old, it was noticed that the right eye had become red, watery, and painful. It was supposed that he had gotten some lime dust into the eye. The child was taken to the family physician, who, for two months, treated the eye. He said there was no evidence of any external injury or the presence of a foreign body. During these two months the eye continued excessively painful. The child was next taken to the late Dr. Chas. M. Shields, under whose care he remained for several months, the mother does not remember exactly how long. Dr. Shields informed her the trouble was due to "inflammation in the ball, and not to injury." Dr. Shields, when he last saw her,

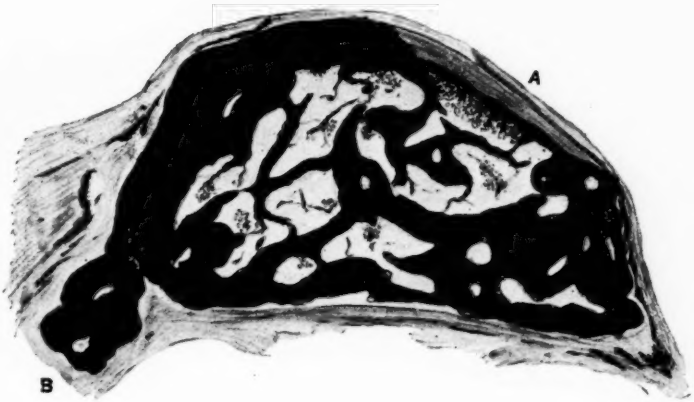
told her that the eye would never recover its sight, that no treatment would be necessary so long as the eye was not painful, but should it ever become painful it would then need immediate attention. The child had never complained of the eye until he was brought to the Richmond Eye Infirmary in 1898. No more accurate history was obtainable. In the left eye there developed, after the enucleation, sympathetic cyclitis, which now, August 24, 1898, after six months' careful attention, seems to be cured.

Pathological Report.—The specimen, a bony-hard lens surrounded with connective tissue, was received in alcohol, then decalcified in phloroglucin and nitric acid, divided antero-posteriorly, rehardened in alcohol, imbedded in celloidin, cut, and stained with hematoxylin-eosin. The eyeball also, mutilated by the removal of the lens, was received, but in so distorted and poorly preserved a condition that it was not examined microscopically.

The lens was of normal size, and even retained approximately its normal shape, but its normal constituent elements had disappeared to give place to masses of compact bone with Haversian canals, enclosing cavities containing fat. The entire lens was of this composition, except the thin cortical layer of a portion of the anterior surface of the lens which consisted of dense fibrous tissue (A, Fig.).

The lens was closely enveloped in connective tissue : anteriorly by an atrophic iris and a pupillary membrane, laterally and posteriorly by the ciliary body and a dense cyclitic membrane. At one spot the regular outline of the lens was broken by an isthmus of bone, joining bone in the lens with bone in the cyclitic membrane. The lens capsule could still be made out at some points, while the regular outline of the osseous lens indicated that the capsule must have remained intact in most of its extent during the formation of the bone.

It is not unusual to find foci of bone in dense membranes of long standing due to plastic cyclitis and choroiditis, or even in the atrophic choroid itself, but ossification of the lens is of very rare occurrence. As a rule, when the capsule of the lens is ruptured, the contents of the capsule are absorbed, and the empty capsule collapses; but if a break in the capsule exists while a plastic cyclitis is in progress, new connective tissue may pass through the break into the lens, and, proliferating there, as the normal elements are ab-


A
B

sorbed, produce a fibrous cataract. This fibrous lens may, in turn, like the tissue of the extra-capsular membranes, become the seat of ossification. In the present case, it would seem that connective tissue entered the lens through a break in the capsule at the point behind the equator where now the normal outline of the lens is broken by projecting bone (B, Fig.). All the new fibrous tissue which formed within the capsule then gave place to compact bone, except a thin, short layer of fibrous tissue, which still remained, at the anterior surface of the lens, and behind which lay a very thin plate of bone, cancellous on its posterior surface (A, Fig.).

A CASE OF BILATERAL HOMONYMOUS HEMIANOPSIA.

By Prof. MANZ, M.D., Freiburg.

Translated and abridged by Dr. J. A. Spalding, Portland, Me.

THE case of bilateral hemianopsia published by Foerster in 1890 under the title of "Cortical Blindness," justly excited great interest amongst neurologists and ophthalmologists, because it touched upon some of the most important points in physiology and psychology. Since then other cases have been published with more or less concordant symptoms, but at the same time such variations, as to give rise to diametrically opposite views concerning their pathological position.

The two chiefly interesting symptoms in Foerster's case were the small central field, with total blindness of both lateral portions, and the loss of orientation in space. It seemed as if these two facts could be brought into immediate connection, perhaps, by assuming that the last symptom was due to the enormous contraction of the field. Such a connection can exist, as is shown by every other case of extreme contraction of the peripheral vision as in glaucoma or retinitis pigmentosa. But it was soon seen that the affair was not so simple. For defective or negative orientation betrayed itself not only in the uncertain movements of the patient, but in his ideas of the topographical relations of localities with which he had before been acquainted. Moreover, in some patients of this type, orientation was perfect; then again, it was lost in some cases of unilateral hemianopsia, and even with a normal visual field. Still farther

the demonstration of similar disturbances is obstructed by abnormal psychical conditions in affections of the brain.

Various explanations have been offered for the small remnant of the visual field. First we had to decide, by numerous observations, whether the form and extent of the field coincided with that in all the other cases, and was performed by the normal anatomy of the parts, and always corresponded to the same region of the cortex, in so far as we could assume a morbid focus in the cortex. Foerster's observations, and my own, showed that there was no exact coincident, the size of the remaining field varying in extent, as well as its grouping about the point of fixation, and its extent in various meridians. So too the share of the lateral halves in the remnant varies. For all that, there were so many coincidences that a common anatomical physiological foundation had to be sought for. The two most reasonable explanations yet offered are: 1. the double supply of the macula by optic nerve fibres which arise from both cerebral hemispheres; 2. a special vascular nourishment of the region of the cortical visual centre in the posterior lobe corresponding to that portion of the retina.

Another point for diagnosis seemed to lie in the color perception, but this in Foerster's case was lost, whilst in others it was normal, or but slightly affected.

The only thing that can decide whether the bilateral innervation of the macula, as assumed by Wilbrand, or the special vascularization of the occipital lobe, as urged by Foerster, is correct, or whether we must look still longer for an explanation of these conditions, is a series of anatomical examinations of which we unfortunately have so few.

Whilst waiting for these, the publication of clinical facts may be of value, and for that reason I now append the report of a case which was, however, not followed by an autopsy. But as I was finishing this, I observed by a reprint handed to me by Dr. Knies, that my case is the same that is mentioned in his article. My only reason then for offering further data concerning a case already published, is that my notes, being taken a year later, bring out some points not mentioned by Knies.

Mr. M., aged sixty-five, was brought to me in February of this year, a stout, heavy man, complaining of excessive helplessness which contrasted very greatly with his apparently excellent vision. I induced him to remain for purposes of closer examination, and to obtain a clearer history of the case. From the patient alone, but little was to be gathered, but from a companion we learned that his parents had suffered greatly from senile weakness, and had died apparently from no disease except senility. The patient had never had an ill turn since childhood. He had always been a moderate drinker; had never suffered from any eye disease, had always seen well, and only of late years made use of glasses for near work.

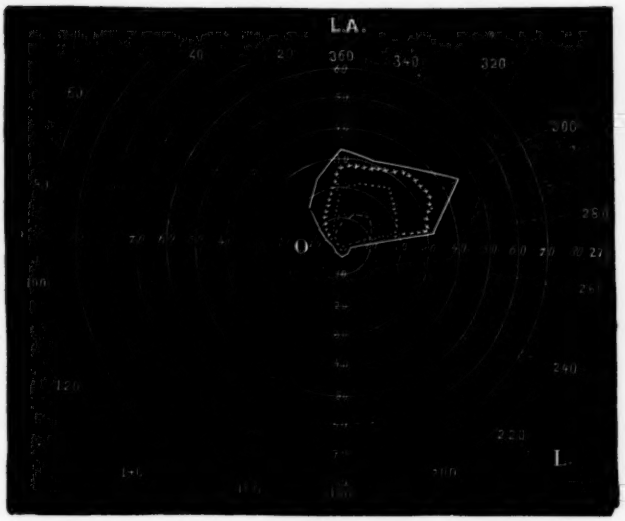
About three years before, he noticed one day that he could no longer see to the right, although direct vision did not change. He could not recall whether he suffered from any other symptoms at that time, and if there were any, they were so slight as to escape his observation. He went on with his trade as a miller, despite well-marked color blindness which simultaneously developed.

About one year ago he discovered on awaking one morning that his sight was much reduced, so that he could not find his way about. Closer examination at that time revealed loss of sight to the left and downward, so that he was nearly helpless. He distinctly asserted that neither on the previous night, nor about that time, did he feel any headache or vertigo. He gave up his business, as his sight did not improve, and later he felt a slight weakness in the right hand which, however, soon disappeared. His memory had lately failed greatly, but no brain symptoms had been noticed by those about him.

It seemed at first, as we observed him, as if his orientation was imperfect, but we soon discovered that it was not that, but a sort of weakness of his will, so that he only did what he was told to do, in the commonest acts of daily life, as in walking, sitting, standing, which he invariably did whenever so asked. He could find his way about, in his own room, though slowly. He answered questions correctly, though with hesitation, so far as his memory served.

The eyes were normal in appearance, the pupils alike in size, reacting well, and with no signs of the so-called hemianopic pupil. The ophthalmoscope showed a few striæ in the lens, normal fundus, a general senile look, and the papillæ rather brighter than normal.

Vision $\frac{2}{3}$ with convex 1.5 ; for near work, convex 5.5.



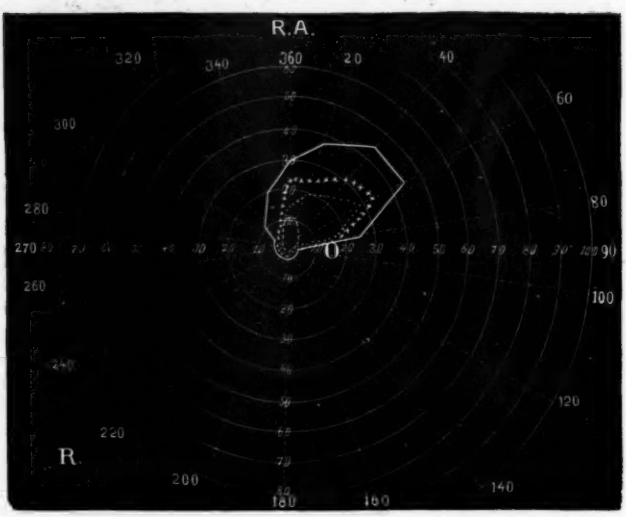
The visual fields showed themselves as in the appended figures greatly contracted, and alike with but slight variations, as to size, form, and topography. The fixation point is preserved in both eyes, though the limit passes close by. The lower half is lost in both eyes, and of the left superior quadrants only a narrow strip remains, the greater portion of the remaining field belonging to the right upper quadrant.

Examination for colors showed the same defects in form and extent as for white, and any variations in form and so forth are probably due to defective observations on our part.

The patient can see all objects in correspondence with his visual ability, and names them according to his mental capacity, together with their uses.

The physical examination showed slight systolic murmur at the tip of the heart, especially distinct on reclining. The two pulmonic tones were less accentuated. There were no nerve symptoms, especially no paresis at all. Walking and standing with closed eyes normal, and the physical force in the right arm apparently perfect. Muscular sensation intact, patellar and plantar

reflexes very active, but without morbid increase ; urine free from albumin or sugar.



The patient's daughter came to us four weeks after her father had left us, stating that the day previous he had had an apparent paralysis of the right arm, and that his general condition had steadily deteriorated. He had, however, at first *seen the floor and to the right side* as never before for four years. The latter improvement in sight lasted only three or four days, and then returned to its former condition. The patient's disposition was much depressed. He died on the 24th of April, exhibiting, for a few days previous, increasing general weakness, extending down the *right side to the leg*, with involuntary contractions on the left side of the leg. His eyes were mostly constantly turned upward, and could not be moved downward, a condition on which we need not lay much stress in one so long since psychically altered from cerebral disease.

Comparison of these conditions with those observed by Knies a year before shows but few changes. The senile degeneration of the brain has altered a great deal in the course of a year. His memory decreased, he became much more helpless, but there was no loss of orientation or soul-blind-

ness. The patient comprehended his surroundings, provided that he had sufficient time in which to think.

The central vision, in comparison with Knies's observations, showed slight decrease for distance, and a stronger presbyopic lens was needed for reading. On this slight difference only little stress need be placed. But the field variations are more important. For whilst the topographical situation of the bilateral remnant in the upper part of the field remains the same, it extended farther upward, especially to the right, whilst in the horizontal meridian to the left contraction was observed.

Comparison of the measurements with those given by Knies showed that apparently some portions of the visual field had widened in the year between the observations. Such a condition has been witnessed in similar cases, without loss of the characteristic homonymous hemianopsia. In this we might find proof that the morbid focus had decreased in size, or that adjacent territory had recovered from its influence. The enlargement ensued in the sense of right-sided hemianopsia, which had from the first probably been the more limited.

The history of the case seems to justify the title of the paper, and the observations made a year before by Knies. The two attacks of blindness occurred without any remarkable symptoms, and particularly without any great psychical disturbances, so that the patient's recollection of the same remained perfect.

The hemianopsia could not be due to any peripheral cause, because the condition of the eyes was normal, with the exception of a trivial opacification in the lenses. If there had been bilateral optic-nerve disease, the optic papillæ would long since have shown some symptoms of it. Neither was there any trace of glaucoma to account for the condition of the field of vision. Therefore, the morbid focus must lie beyond the optic nerves. An affection of the tractus opticus was negatived by the absence of the hemianopic pupillary reaction, and partially by the bilateral affection. If we are obliged to look for the focus beyond the optic ganglion, there must have been two, one in each

cerebral hemisphere in the same position, though not necessarily of the same size.

In view of the results of experiments on animals observers of cases of bilateral hemianopsia have located the morbid focus in the so-called visual centre, in the posterior lobe, a supposition supported only by a few autopsies. These experiments would, therefore, seem to place the cerebral lesion in this patient in the posterior portion of the brain—that is to say, that that part of it was destroyed to which the nerve fibres run, and where they terminate. Nevertheless this need not have affected the same spot on both sides, probably on one side in the cortex, on the other in the nerve fibres running toward that locality, the so-called Gratiolet's bundle of fibres. On one side at least, the portion corresponding to the macula in the retinæ, the apex of the fissura calcarina (Henschen), must have been preserved from destruction; or even on both sides, although the latter view is hardly probable. If the destruction on one side had been total, we should have to explain the remaining field by accepting the theory of the so-called double nerve-supply of the macula, connecting it with both hemispheres. In the same way, the projecting field in unilateral hemianopsia becomes comprehensible.

In addition to hemianopsia, all of these cases exhibit more or less nervous symptoms, due to participation of the nerve tracts which are in connection with the cortical visual centre. Amongst these we have disturbances in reading or writing, aphasia, loss of orientation, and soul-blindness, most of these being transitory or even permanent symptoms of hemianopsia. In our case there was nothing of the sort. The only actual extrinsic symptom, and that occurring long after Knies had seen the case, was a frequent sensation of weakness in the right hand. Motor weakness could not be demonstrated at that time. It is well worth observing, however, that this transitory paræsthesia was only perceived by the patient after *left-sided* hemianopsia.

I am inclined to doubt the veracity of this observation, and I think that the beginnings of this symptom escaped the patient's notice. To regard this as a mere distant effect

would forbid the further development into complete paralysis, which appeared later. It is more probable that the degeneration from the original morbid focus gradually extended in the direction of the internal capsule. Such a view would favor Knies's opinion, that the focus was not in the cortex, in the so-called visual centres, but in Gratiolet's bundle. An autopsy alone could confirm this opinion, provided that the original anatomical appearances were not disarranged by later secondary destruction.

The actual pathological alteration in this case was probably a *vascular thrombosis*, as the sudden attack goes to prove. This view also finds support in the atheromatous alterations in the vessels, the hardness of the radial artery, and the heart sounds in our patient.

The hemianopsia in some cases is preceded by total blindness, often following a longer or shorter loss of consciousness, such as accompanies an apoplectic shock. Of this nothing seems to have occurred in our patient, or was, at least, never observed. On the contrary, we must emphasize the alleged extreme improvement of sight occurring soon after the patient's return to his home, but gradually disappearing once more. So far as one can understand, this improvement consisted in an *actual enlargement of the visual field*, as demonstrated by his insistence that he could see so much better down toward the floor than of old. In spite of the old man's mental calibre, we must grant that there is some truth in the occurrence, rare though it may be, and that it suggests a temporary improvement in the cerebral circulation—temporary indeed, but one by which the implicit peripheral portions of the retina were once more restored to improved function by increased blood supply. Too much weight must not be laid on such an idea, for, after all, the improvement of a sensory function in affections of the brain may depend on improvement in the general condition, and be rather of a psychical than a physical nature. The view of improved nutrition by gradual development of a collateral circulation is excluded by the brief duration of permanent improvement in this instance.

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A CASE OF SARCOMA OF THE CILIARY BODY.

By Dr. O. WALTER, Odessa, Russia.

Translated by Dr. Selina Bloom, New York.

(*With 6 figures on Plate IV. of Vol. XXXII., German Edition.*)

IN the January number of the *Centralblatt f. Augenheilkunde*, in 1895, Hirschberg and Birnbacher published a case of sarcoma of the ciliary body, with resulting irido-dialysis. According to these authors, theirs was the fourth case of this kind on record in the literature, and it may therefore be of some interest to add a fifth, which was observed and treated in the hospital here by my colleague, Dr. Rabinowitsch, who had the kindness to leave its description to me.

Sarcoma of the ciliary body is interesting enough of itself, on account of its comparatively rare occurrence, aside from the special interest a resulting irido-dialysis affords, for, according to the classical monograph of Fuchs (*Das Sarcom des Uvealtractus*, Wien, 1882, S. 165), only 9 per cent. of all uveal sarcomata are of the ciliary body, as compared with 85 per cent. originating in the choroid.

The clinical history in our case shows the following data on the 28th of July, 1895:

Tscharna T., farmer's wife, forty-seven years of age, stated that two to three months previously she had noticed that the sight of the left eye was beginning to fail. The deterioration continued increasing without any accompanying pain or annoyance, except that the eye would water occasionally.

Status præsens.—V O S = 0.2 to 0.3. Left eye: lids unchanged; the veins of the conjunctiva bulbi somewhat fuller than on the

right. Cornea normal; the anterior chamber shallower in the lower-outer quadrant, where a bulging forward of the peripheral parts of the iris is noticed, caused, seemingly, by dark grayish-brown masses, which also fill the angle of the anterior chamber itself (see Fig 1, T.). There is further in this quadrant of the iris a fold running parallel to the periphery (Fig. 1, F.). The pupil is not fully circular, but flattened toward the bulging part, reacting less promptly here than in other parts. Temperature normal. The ophthalmoscopic examination showed normal conditions when the pupil was not artificially dilated, and when the eye was directed straight forward; if the eye was directed to the left or below, sharply defined masses of semicircular form appeared in the field of vision, coming from the lower-outer part of the globe. After the instillation of atropine the pupil dilated in the upper-inner half only, while the outer-lower half remained as it had been. Now, with the ophthalmoscope, one sees a dark tumor, about as large as a small cherry, having a knotty, uneven surface. The tumor seemingly takes its origin from the ciliary body, directly back of the lens, and bulges toward the vitreous. The fundus was normal otherwise. So was the motor apparatus of the eye. Right eye healthy.

No changes could be found in the internal organs.

June 29th.—Enucleation of the left eye.

July 8th.—Wound healed, patient dismissed.

The eyeball, which was of normal size, was hardened in a 10 per cent. solution of formalin, and imbedded in celloidin.

It is worthy of note that the transparency of the cornea and of the tunics of the eye were so well preserved that if the ball was held up by the optic nerve toward the window, the tumor could be clearly seen shining through the cornea and pupil, and it was possible to see that it occupied the entire outer-lower quadrant of the globe, its bordering points corresponding to the points of insertion of the inferior and external recti muscles. Its greatest height was reached about midway between these points, while posteriorly it extended as far as the equator.

On the surface of a cut made through the meridian of 45°, through the thickest part of the tumor, the following conditions were found. Cornea and sclera are everywhere of normal thickness. The peripheral part of the iris is pressed

forward against the posterior surface of the cornea, the anterior portion being sharply bent (Fig. 2, J.); the ciliary end of the iris is continuous with the tumor, which occupies the entire ciliary region and also the anterior portion of the choroid (Fig. 2, T.). The anterior third of the tumor appears perfectly black, whereas the posterior two thirds is streaked black and white, like marble, the black color increasing toward the edge, so that the lighter centre is surrounded by a black border. The anterior dark third is separated from the posterior paler portions by a sharp line of demarcation. The rest of the choroid is not altered in thickness. The retina became detached in making the section, except a small portion at the base of the tumor, where an exudate separated the retina from the tumor (Fig. 2 and Fig. 5, E.). The lens is displaced upward and inward.

Microscopical Description.—A large number of sections were made through the tumor and anterior portion of the globe parallel to the meridian of 45° (sections extending from above inward to below outward). The outer layers of the cornea are normal; on the Descemetii, however, a deposit of pigment was found (Fig. 3 and Fig. 4, P.), continuous with that of the tumor (Fig. 4, P.). In the region of the insertion of the ciliary muscle (Fig. 3 and Fig. 4, M.c.) and of the rectus externus, there are pigment granules between the scleral layers. The vessels of the sclera are dilated and filled with red blood-cells, between which quite a number of pigment granules can be found. In every other way the sclera is entirely free and separated from the tumor. The iris presents a different appearance according to the part we examine. It is normal at the pupillary margin, becoming more and more infiltrated with pigment toward the ciliary border. The pigment is irregularly deposited throughout the parenchyma, and there is besides a thickening of the physiological pigment layer. The pigment increases finally to such an extent that the structure of the iris is no longer recognizable, and everything merges into the black anterior portion of the tumor. The anterior chamber angle is also filled with black tumor masses (Fig. 4). The ciliary body has become resolved into tumor mass in the entire lower-outer quadrant, though its structure

can be more or less clearly recognized in the flatter anterior portion (Fig. 3). Here one still sees smooth-muscle fibres as well as some intimation of ciliary processes in spite of the tremendous increase of pigment, and at some points the epithelium of the ciliary processes is still recognizable. Sections through the summit of the tumor show that the direction of the ciliary muscle is changed. It is directed from the point of insertion of its tendon toward the middle of the vitreous just as if it had been turned upon the tendon by the force of the tumor masses behind it (Fig. 4, M. c.). Immediately back of this is the lighter streaked portion of the tumor having its streaks of pigment extending from its periphery toward the centre (Figs. 4 and 5).

Posteriorly the tumor becomes suddenly narrow, passing into the vascular layer of the choroid. The lamina vitrea of the choroid and the pigment-epithelium of the retina cover the tumor for a short distance, only to disappear, changed in structure, into the tumor mass. The retina shows a fibrous degeneration in the anterior parts and at the summit of the tumor, otherwise there are no structural changes. Near the base of the tumor it is separated from the tumor by a homogeneous exudate (see Fig. 5, E.).

With higher magnifying power, the tumor is found to be made up of a large number of cells of two distinct kinds: round non-pigmented cells (Fig. 6, a.), and irregularly shaped large pigmented ones (Fig. 6, b.). There is a fibrillated intercellular substance containing a number of larger or smaller pigment masses. The round non-pigmented cells are found only in the paler parts of the tumor, where they are closely packed, whereas the pigmented ones are found everywhere, though there are fewer in the above-mentioned paler portion, in which the pigment has more the form of patches and granules. The nearer we approach the darker portions, the more numerous are the pigmented cells, until finally they form the entire tumor mass. In the same order, a change in their structure takes place; they take on more and more the form of the pigmented cells of the choroid, having a short spindle-shaped body and branches, and a more or less non-pigmented nucleus. Vessels are only

scantily present in the tumor, and are found in the periphery principally. The non-pigmented tumor cells placed around the vessels are smaller than the others, and have much less protoplasm and larger nuclei, which relation becomes gradually changed the farther away the cell is from the vessel. In the central parts of the tumor, large cavities are to be found filled with caseous masses and minute pigment granules.

This is without doubt a melano-sarcoma in the first stage. It takes its origin from the posterior part of the ciliary body, its growth continuing in all directions along the surface, besides growing into the vitreous. The tumor in its growth has pushed the anterior portion of the ciliary body, as well as the root of the iris, toward the front, destroying them and causing at the same time a detachment of the retina. The tumor grows by an increase of pigment at first, such as we saw in the ciliary end of the iris, producing the clinical picture of irido-dialysis noticed. The condition of the sclera is of special interest where pigment granules were found between the lamellæ and in the vessels, even as far outward as the insertion of the m. rect. ext. As the sclera was found intact everywhere else, these pigment-granules must have reached these points by means of the blood and lymph channels. This fact must be regarded as a grave prognostic sign, and explains the frequency of the appearance of metastatic tumors during the first stage of sarcoma, as Fuchs especially has pointed out (*l. c.*, p. 277).

INJURIES OF THE EYE.

By Dr. HILLEMANNS,

ASSISTENZARZT AM NEDERL. GASTHUIS VOOR OOGLIJDERS, UTRECHT.

Translated by Dr. A. N. Alling, New Haven, Conn.

(*With one text cut and Plates VII. and VIII. of Vol. XXXII., German Edition.*)

PART II.

I.—REPORT OF CASES.

FROM among the great number of injuries reviewed in the first part of this work,[1] two, which I shall report in detail, especially excite our interest.

I.—*Perforating Wound of the Globe with Foreign Body in the Optic Nerve.*

A fragment of stone flew into the eye of a fourteen-year-old stone-breaker on December 28, 1893. Two days later the following conditions were found: A perforating wound of the limbus near the vertical corneal diameter extending 3 *mm* backward into the ciliary region. Incarceration of iris. Traumatic cataract. Hæmophthalmus. T. n. V uncertain quantitative perception of light without localization. The other eye showed some irritation and photophobia. On January 8th enucleation of left eye on account of irritation of right. While cutting through the optic nerve the scissors struck a hard substance which proved to be the fragment of stone lodged in the midst of the optic nerve. In order not to disturb this rare specimen the globe was opened in the equator. The vitreous was pressed together into a thin cylinder by excessive hemorrhage. Behind the slightly detached retina lay a thin layer of blood.

[1] See abstract, these Archives, p. 427, 1897.

(*a*) The discovery of a foreign body in the optic nerve is very rare. I find the following reports:

1. Case of Von Butler, 1834,[1] a man, fifty years old, was hit and blinded in the left eye by a shot three and a half years before. Pain of great severity in the eye and head had occurred periodically and the sight of the other eye was affected. The left eye was somewhat smaller than the right and free from inflammation. On the inner side of the eyeball, where the needle is introduced in depression of cataract, only a little more anterior, was a fistulous opening through which a fine probe could be passed into the posterior chamber. Iris was uninjured. Cataractous lens, ossified and calcareous, was extracted. Enucleation on account of pain six and a half years after injury. In the nerve, where it pierces the sclera, was a shot. Afterwards the sight of the right eye improved.

2. To this unique case was added that of Von Gräfe which Leber reported.[2] A shot entered anteriorly near the edge of the cornea, passed out at the back near the edge of the papilla, and remained lodged between the nerve and its sheath.

3. Webster enucleated the eye of a man where a percussion cap had penetrated the upper lid and entered the eyeball in the ciliary region. No perception of light. The shell, unchanged in form, completely covered the nerve with its concavity and remained with its sharp edges rather deeply fixed into the background of the eye. The optic-nerve fibres were completely severed.[3]

4. Bowen found a splinter of metal 2½ *mm* long forced firmly into the optic nerve. It remained seven years without disturbing the other eye. Sympathetic ophthalmia with photophobia, ciliary congestion, and discoloration of iris ensued, with degeneration of the uveal tract.[4]

5. Krüger presented a patient in Heidelberg in 1887[5] with a foreign body fixed in the centre of the papilla. It had entered through a small wound in the neighborhood of the inner corneal margin and passed through the iris and lens. Blood-vessels of the papilla were not wounded. V $\frac{1}{10}$. Later, evidences of inflammation of retina, no white spots about the macula, small isolated hemorrhages at the periphery of the retina. The foreign

[1] Yander u. Geissler, *Die Verletzungen des Auges*, 1863, p. 226.
[2] Gräfe-Sämisch, *Handbuch*, v., 916.
[3] *Centralbl. f. pract. Augenheilk.*, 86, p. 467.
[4] Mauthner, *Die symp. Augenleiden*, p. 12.
[5] *Bericht, Klin., Monatsbl.*, p. 180.

body completely covered by exudation. The overlapping of the foreign body beyond the papilla caused a corresponding enlargement of the blind spot. Otherwise the field of vision was normal.

6. Hoffmann reported a similar case. He found a locksmith with a wound of the cornea and iris, traumatic cataract, and after extraction of the latter a piece of steel exactly in the centre of the papilla. V ½. The foreign body produced no disturbance for years. This, then, would not appear to be a very unfavorable place for lodgment.

According to the observations of Berlin,[1] the foreign bodies which enter the interior of the eye free, almost without exception reach the background, and the majority then fall back into the vitreous, while a small number remain lodged in the posterior wall, and yet a smaller number find their first resting-place back of the eyeball. I might add that the bodies in the region of the optic nerve more rarely rebound on account of the lesser resistance in this part of the fundus, but remain lying there, or pass deeper into the nerve substance.

(*b*) It was surprising that the small piece of stone should produce such immediate and almost complete loss of function. Such excessive hemorrhage, accompanied by immediate extreme loss of function, is not usual with a foreign body only 1 *mm* in size. In such cases we find central quantitative perception good, while commonly the upper part of the field of vision is disturbed as a result of the sinking of the blood, or of the foreign body itself. Berlin found, by his observations,[2] that the greatest degree of central and eccentric loss of sight after injuries was always accompanied by diffuse suppuration in the vitreous, by which the nerve elements were seriously affected. But once did he find, in a recent case, only a trace of light perception without orientation, although the anatomical examination of the eye showed no pus, but a complete substitution of blood for the vitreous. If, after a perforating injury by a small foreign body, excessive hemorrhage into the vitreous and almost complete loss of function ensue, we would naturally think of an injury to the larger vessels of the nerve. It need hardly be stated that the number and situation of the nerve fibres destroyed will have a

[1] *A. f. O.*, ii., 13.
[2] *A. f. O.*, 14, 321.

corresponding effect on the degree of loss of function. In cases otherwise favorable the loss of function in absence of bleeding is relatively slight, according to observations of Krüger and Hoffman.

(*c*) It seems, in the third place, worthy of note that enucleation should have been done so relatively early for the protection of the other eye, although that the symptoms of irritation were really the forerunners of an inflammation I hesitate to assert. The finding of a foreign body in the nerve suggests a connection with Deutschmann's theories. If the optic nerve is the channel of communication for the sympathy, it is fair to assume that, by the direct injury to the nerve itself with infection, the resulting shortening of the path would cause earlier sympathetic manifestations. Deutschmann himself has found, however, that no longer time elapsed for the inception of a sympathetic papillitis, when the spores of the aspergillus fumigatus were injected into the vitreous, than in the nerve. He concluded that the inflammatory process which would be directly set up in the nerve and sheath prevented quick propagation. Has sympathy in the other eye been at any time observed after injury of the nerve inflicted through the orbit? Such injuries are well known.

Aschmann,[1] for example, in his dissertation, collected twenty-one cases. After excluding a few of these as unsuitable for our purpose, because death soon occurred from brain complications, or because indirect injury to the nerve by bone splinters was possible, there yet remain enough to show that optic-nerve injuries do not affect the other eye by sympathy, even although the object producing the wound is probably the bearer of infection, or although the size of the wound, in the days before antisepsis, opened the doors to infection. I know also of a case where the orbit and optic nerve were pierced by a dagger, and one, before mentioned, of luxation of the globe and laceration of the optic nerve. An exact counterpart to these cases, in which no trace of change appeared in the other eye, is the case of Pagenstecher,[2] in which, after rupture of the sclero-corneal juncture and tearing of the nerve from the scleral opening by a blow from a cow's horn, four weeks later sympathetic ophthalmia occurred. One can justly offer these cases in opposition to Deutschmann, especially after the experience of Trousseau and Schmidt-Rimpler,

[1] *Beitrag zur Lehre von den Wunden des Sehnerven*, Zurich, 1884.
[2] *A. f. A.*, viii., 65.

who saw sympathetic inflammation develop after resection of the optic nerve. Deutschmann, in explanation of this, claims a free communication with the globe by lymph streams. Velhagen,[1] Bach, and Zimmermann have refuted this. I cannot understand how the fact that sympathetic ophthalmia is never observed after wounds of the optic nerve, when the eyeball is not opened, can be reconciled with the theory of Deutschmann.

II.—*An Interesting Case of Injury with Percussion Cap.*

This case is worthy of closer examination on account of the surprisingly good result. Yet more especially because, at a later period, a peculiar deposit of copper appeared on the anterior capsule, which by its arrangement furnishes a contribution to our knowledge of the lymph circulation in the eye. The principal data in the history are as follows:

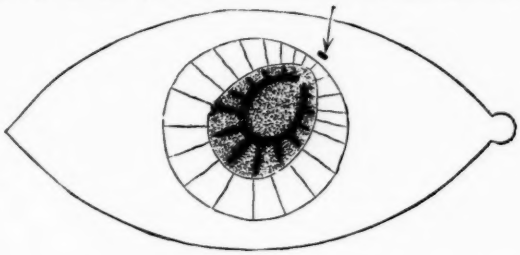
A man, twenty-four years old, as the result of an explosion of a "spoon," filled with powder and percussion caps, received severe injuries to both eyes, both legs, and the right arm. O S perforating wound of cornea, traumatic cataract, foreign body in eyeball. T. —. O D perforating wound at limbus, traumatic cataract, foreign bodies in conjunctiva and in eyeball (probably). On May 3d, O S incipient phthisis, eye soft, red, painful. V o. O D upwards and outwards, at limbus, 1 *mm* from corneal edge, a small pigmented scar. Pupil drawn in that direction, as a result of healing of the ciliary border of the iris into the scar. Lens clear, no posterior synechiæ. Floating opacities in vitreous, and a fixed dark mass upwards and inwards in the vitreous; no foreign body discernible. V $\frac{20}{200}$. T. n. Projection good; no peripheral scotoma. Eye irritated. Photophobia. May 13th, enucleation L.

The right eye gradually improved to a surprising degree, and on dismission from the clinic, July 1st, it was free from irritation in spite of floating opacities in the vitreous, and a white mass of exudation on the floor of the vitreous chamber. On August 6th, for the first time, a metallic sheen was discovered upwards and inwards in a blackish mass.

One year later, August 25, 1894, a careful examination of the now entirely quiet eye revealed the following conditions: by daylight I perceived a peculiar gold-green reflex in the pupillary space, which I thought was an opacity of the lens, but the vision

[1] *A. f. A.*, xxix., p. 345; these ARCHIVES, xxv., p. 349.

was actually better than 1. The examination by focal illumination showed a peculiar olive-colored deposit which was so thin that the transparency and the examination of the fundus by the ophthalmoscope were not in the least hindered. Under atropine mydriasis, the deposit showed the following arrangement (see accompanying figure) : It was surrounded by a ring-like, brown-



ish opacity, which corresponded exactly to a medium dilatation of the pupil. The pupil was, as stated, obliquely oval. The brown ring also had exactly this form, but upwards and inwards at the situation of the partial coloboma it was not closed. Inside the ring the olive-colored opacity was more homogeneous—outside its arrangement was more striated. The floating opacities in the vitreous had disappeared. In the fundus, downwards and outwards, in the inverted image (Plate VII.) there extended from the papilla a black mass of pigment under the retinal vessels. In front of this was a grayish opacity in the vitreous. Farther outwards appeared a whitish atrophic area with pigmented borders. Still more peripherally in the region of the equator were two fragments of metal—a larger and a smaller. At the last examination, September 21, 1894, the pigment was somewhat increased, and the pieces of metal more veiled. V fully 1. Small scotoma with perimeter downwards and outwards. I changed my opinion about the presence of two pieces. I cannot believe the two fragments could have entered through the small wound, and suspect that the middle portion of one piece was invisible or had been absorbed. Since the patient had not presented himself in the clinic as late as January, 1896, it is fair to assume that no diminution in the function has taken place.

It is extremely rare that a piece of percussion cap has remained in the fundus or vitreous for months or years with-

good or only slightly disturbed function. The important observations of this nature are as follows:

1. Weidmann.[1] Piece of copper in vitreous four and a half years without appearances of irritation. V $\frac{1}{3}$.

2. Schelske.[2] Percussion cap in retina three years without evil results except slight defect in field, pigmentation, and atrophic spot in choroid.

3. Pagenstecher.[3] A piece of percussion cap in the depths of the eye did not cause inflammation until after three or four years.

4. v. Gonzenbach.[4] An encapsulated piece of copper quiet in the fundus for ten months with good function.

5. Kipp.[5] Piece of copper under the retina quiet for twenty-four years. V $\frac{1}{4}$.

6. Goldzieher.[6] Fragment of copper, ten years. Fine opacity in anterior part of lens. Opacity of vitreous. Orange-red variegated spot in anterior layers of retina, in macular region, with metallic lustre. There was impregnation of the retina with dissolved copper, which he called "chalkosis retinæ."

7. Knapp[7] details fourteen cases where foreign bodies were healed in the background of the eye with the preservation of good vision. Twelve cases were of iron or steel, one each of copper and stone.

In spite of these isolated observations, the prognosis of our cases must be guarded. It is possible, as in the case of Pagenstecher, for inflammatory symptoms to appear, even after years, as a result of change in position of the foreign body, as observed by Knapp in case of a splinter of iron. Retinal detachment or degeneration by chemical action may also occur. The possibility of expulsion of the foreign body by a circumscribed breaking down of the tissues can be proved by clinical experience. Such observations, where this has taken place after months or years, are numerous,

[1] *Diss.*, Zurich, 1888. Ref. *Centralblatt*, 1889, 42.
[2] *Arch. f. Ophth.*, ii., 28, 224.
[3] *Arch. f. Ophth.*, ii., 28, 225.
[4] *Klin. Monat. f. Augenh.*, 1892, 197.
[5] Ophth. Congress, Edinburgh, 1894.
[6] *Centralblatt*, January, 1895.
[7] These ARCHIVES, xi., p. 222.

and, it seems, occur mostly in children and in eyes already sightless.

For the extension of our knowledge of the action of copper in the eye we have to thank Leber most of all,[1] who has experimented with the destructive chemical action of metals. If the metal finds a resting place in tissues rich in blood-vessels, as the iris or ciliary body, it excites suppuration even though aseptic. The retina as a consequence becomes atrophic and necrotic. He considers fibrillary degeneration accountable for the retinal detachment which he so often observed. Leber suggests the following treatment for copper and percussion-cap injuries.[2] In recent cases if there is no, or only slight, inflammatory action, if the situation of the foreign body can be determined, one should attempt its extraction unless it may be that it behaves like an extremely small particle. If the foreign body is invisible on account of hemorrhage, cataract, or pus in the vitreous, and the eye is judged to be lost, it should not be enucleated, but an attempt should be made to extract the foreign body and to preserve the blinded eye in the hope that the suppuration is of chemical and not bacterial origin and will eventually subside. Gun-cap injuries are for the most part aseptic on account of the heat of the explosion or chemical action of the copper, therefore danger of sympathetic ophthalmia is generally absent. If the inflammation is not severe, and suppuration in the vitreous remains circumscribed, the case is then undoubtedly aseptic. Bacterial examination of the extracted foreign body or exudate should be made. Further evidence is offered by the prompt healing of the wound and disappearance of the pus. Leber gives as a basis for his opinions statistics of 46 cases of copper and brass injuries, observed during twenty-three years. Of 39 cases treated for foreign bodies in the background of the eye 9 were enucleated or exenterated. In 4 only preliminary iridectomy or cataract extraction was done, and in 25 the removal of the foreign body was attempted—successful in 18. Two of the latter were later enucleated, which seemed to him, after anatomical

[1] *Die Entstehung der Entzündung.*
[2] I quote from *The American Journal of Ophthal.*, vol. xi., 1894.

examination, to have been superfluous. In 8 partial vision was attained, varying from fingers at 1 *m* to V $\frac{1}{6}$. But this in most cases was gradually lost. In 3 cases very favorable for removal of the foreign body results were: counting fingers, fingers at twenty feet, quantitative perception of light. Sometimes when purulent infiltration or traumatic cataract was present, he obtained a satisfactory degree of vision after removal of foreign body. After this experience Leber had never seen sympathetic inflammation or sympathetic irritation.

In regard to the enucleation of an eye containing a fragment of percussion cap. Ophthalmologists to whom the bacterial origin of sympathetic ophthalmia is not convincing, will be governed as in any other sort of injury. One advantage of the conservative treatment certainly is, that a deformed eye is better for a working man than an artificial one.

Whether to attempt the removal of the foreign body is, many times, a difficult question. I think this should be abstained from in those rare cases in which, after the subsidence of the inflammatory symptoms following the injury, the eye remains entirely or almost completely free from irritation, although a foreign body is visible or definitely known to exist, in the vitreous or fundus. Not only is the prognosis after removal unfavorable, but, as evidenced by the foregoing observations, it is not impossible for a foreign body to remain innocuous for years within the eyeball.

While discoloration in injuries with iron, under the name siderosis, is a common appearance, an analogous condition in injuries with copper is almost unknown. The discoloration of the retina in the case of Goldzieher and the peculiar deposits on the lens capsule in our case, seem to be the first examples of "chalkosis" in the eyeball, perhaps excepting the observation by Arlt of discoloration of the lens in the vicinity of an imbedded fragment of copper. According to Leber, the iron oxide is dissolved by the CO_2 in the tissues, as bicarbonate spreads by diffusion, and by separation of the acid is precipitated as insoluble oxyhydrate. There is no doubt that copper in the eye partly gets into solution.

These two cases admit of no other explanation. The exact chemical reaction, I do not know.

But how, in our case, was the dissolved copper deposited on the anterior capsule? Here only was the discoloration observed, and the brownish ring as described had the exact form of the oval pupil moderately dilated, and was open above and inwards where the iris did not lie closely upon the capsule, but was drawn away from it, as the result of healing of the iris, into the wound. Samelsohn [1] and Fuchs [2] observed in injuries with iron particles a regular wreath of rust-brown points on the posterior surface of the anterior capsule, in a situation corresponding to the major circle of the iris, where the zonular fibres are attached to the anterior capsule. According to Samelsohn, the iron oxide would be filtered from the lymph current by the fine pores found here. The form and situation of the ring in our case exclude such an explanation. It is evident that the dissolved copper was separated from the lymph current in the anterior chamber, but in entrance was held back and accumulated, on account of the fact that the edge of the pupil lay in immediate contact with the anterior capsule. A part passed through the narrow passage, and formed a thin deposit in the pupillary space. A fortunate combination of circumstances has thus furnished the clinical proof that, as was undoubted on ground of experimental evidence, the fluid stream from the posterior to the anterior chamber goes through the pupil.

II.—CONCERNING INJURIES TO THE EYES, AND PROTECTION OF THE EYES IN STONE-QUARRIES, WITH SPECIAL REFERENCE TO THE USE OF PROTECTIVE SPECTACLES.

The great number of injuries from the quarrying industry, coming under observation at the Bonn clinic, prompted me to study this subject. I have made use of material kindly furnished me by the Quarry-Union, Section IV., Rhine provinces and Birkenfeld, supplemented by extended visits to the largest basalt and sandstone quarries of the Rhine. That injuries to the eyes are numerous, produce extended

[1] *Kl. M. f. A.*, 1881, 263.
[2] *Lehrbuch*, 1893, S. 289.

incapacity, and are a source of trouble and expense to the unions, is evidenced by statistics.

In the report of the Berlin board of directors of the Quarry-Unions, concerning benefits paid for disability for more than 13 weeks, from 1885 to 1891, I find 526 injuries to the eyes by stone fragments, or 8.7 % of all accidents.

I am convinced, however, that injuries to the eyes are in reality much more numerous than statistics would indicate. In Bonn, during the year 1893–4 alone, we treated 39 cases of injury by stone fragments, from the neighboring quarries. Further, out of 38 cases of serpent ulcer 22 originated in injuries by pieces of stone and produced incapacity sufficient to demand benefit insurance. Some cases also are undoubtedly classified under other heads.

The manifold character of the various divisions of the quarrying industry requires close study. Although injuries by stone fragments are naturally the most frequent, some happen by explosions or by pieces of iron flying from the tools. The frequency of accidents differs with the character of the material. The greatest danger is in the basalt quarries on account of the hardness of the rock,—the least is in the limestone and sandstone quarries. The following are the various divisions of the work in the sandstone and trap quarries of the Rhine with which I am most familiar. 1. The "stone-breaker," who breaks blocks from the rock wall. 2. Rarely powder or dynamite (for basalt) are used. 3. "Stone-pounders," who break up the large blocks with heavy hammers or with chisels. 4. "Trimmers," who break into regular paving stone with oblique blows; dangerous to bystanders. Sharp sight is needed. 5. "Reducers," who break the rock into small pieces with long-handled hammers. This is the most dangerous for the eyes of the workmen as well as for those near by. Especially sharp sight is not needed.

In the quarries which I visited, in spite of the regulations protective glasses are, as a rule, only worn by the "reducer," —generally No. 17 (see later). The workmen complain that the spectacles with glass settings are not sufficient protection and the wire netting interferes with sight.

Although I have noted in the first part of this work a strong predilection toward the left eye in injuries by stone, a fact observed by Ottinger,[1] and later by Nieden,[2] with a more exact knowledge of the quarry industry I am in doubt whether the left eye is really more threatened by the character of the work.

Concerning the Protection of the Eyes in Quarries with especial reference to Protective Spectacles.

The statement in regard to this subject in the "Regulations for Protection against Accidents in Quarries," 1889, reads as follows: "It is held that suitable protective glasses should be provided by contractors when necessary." This was extended in 1893 to read: "In work which, from its nature, subjects the men to injuries of the eyes, as breaking stone into small pieces (reducer) or working on hard rock, suitable glasses shall be worn, provided at the cost of the contractor. The men shall be separated from one another by a suitable space or by screens." Efforts are made to enforce this rule by fines or threats of discharge. Section IV. of the Quarry-Union (Cologne) has taken special interest in this subject, and with the help of their experience I am able to formulate the principal defects in protective spectacles.

1. The mica spectacles were discarded. Cohn[3] concludes that they are unbreakable, lighter, cheaper, and cooler than glass. The disadvantages, however, are such that they are unsuitable for most sorts of work. The mica prevents clear sight. The distortion, false images, and irregular refraction produce eye-strain, headache, and dizziness. They are difficult to keep clean.

2. Many spectacles give imperfect protection because: (*a*) they do not prevent entrance of foreign bodies between the glass and the face; (*b*) because the two parts are bound together by an elastic, which, in stretching, gives the rims an improper position; (*c*) on account of too coarse meshes of the wire netting.

3. Many glasses cannot be worn although they give proper

[1] *Klin. Monatsbl.*, March, 1894.
[2] *Centralblatt*, June, 1895.
[3] *Lehrbuch der Hygiene des Auges*, 1892.

protection: (*a*) because the rims are too small. One model had its support, not on the bony edge of the orbit, but on the eye itself. (*b*) Not sufficiently concave to allow movements of the lids. (*c*) Poor ventilation, especially the glass setting, heating the eye, and steaming the glass. (*d*) Too heavy. (*e*) Curved glass gives reflexes. 4. Poor material. 5. Spectacles must not be too expensive.

In Plate VIII. are 13 different models, the greater part of which have proved ineffective. Their faulty points will be easily seen in the light of the preceding remarks.

In many accidents, carelessness or indifference of the workmen plays an important part. The men are averse to the common spectacles which scarcely deserve the name of protective glass. The following are statistics of the Iron and Steel Industry Association regarding the use of protective spectacles in 83 large factories: spectacles of glass in 21 factories, of wire netting 12, of mica 18, of glass and netting 32. The men willingly furnish spectacles, 7; by regulation, 6; unwillingly, 35; only by oversight, 24; by threats of fine, 11.

Herr Zervas, in 1889, introduced the spectacles No. 17, of our collection, urging that: (*a*) they are made of galvanized iron wire to prevent rust and wear: (*b*) completely and comfortably cover the upper part of the face, capable of adjustment by bending; (*c*) high resisting power on account of great convexity; (*d*) movements of eyes unhindered and satisfactory ventilation; (*e*) conveniently folded and preserved. The meshes of the netting are 0.7 *mm*; weight, 22 *gm*; price 35 *Pf.* Obtained from C. S. Schmidt, Niederlahnstein, on the Rhine. In my judgment this is a good form. It fulfils entirely the requirements of the workmen who do not need sharp sight. I have convinced myself that the men willingly and almost universally wear them.

The spectacles No. 18 are a newer form. The concavity is less and a piece of strong glass or rock crystal is set in. The meshes of the wire are larger to insure ventilation. Since the introduction of glasses of similar form in the railroad shops at Cologne, no eyes have been lost for five years, while formerly every year many of the injuries went to ruin.

Greater curvature is a stronger protection against flying fragments. Samelsohn believes that rock crystal is better than glass, on account of its heat conductivity which prevents troublesome steaming, and because in its manner of breaking it is less dangerous than glass.

My experience was that in the quarries the spectacles No. 18 were not kindly received. The following were the complaints: (a) The glass soon became soiled and is difficult to keep clean. The sight is obstructed, work slower, and contract work less profitable. (b) The close-fitting frames are hot and the glass is steamy. (c) They are heavy and uncomfortable. (d) Sunlight blurs and pains the eyes.

The objections a and d are dependent upon the properties of the materials employed. Complaints b and c I believed could be remedied in part. In place of the larger round glass 50 *mm* in diameter, I substituted an oval whose diameters are 42 *mm* horizontal and 30 *mm* vertical. The field of vision is not materially narrowed and the weight diminished to 20 *gm*. Further, I secured better ventilation by bending out the upper border of the rim from the forehead. As no flying pieces come from above, this is safe. The maker of No. 18 is C. S. Schmidt, Niederlahnstein—price 1.25 M. My modification is made by optician Olland, Jr., Utrecht. Price 1.40 M.

I made a further suggestion to the Union, Section IV., that periodically the eyes of the men should be examined for dacryocystitis, which is certainly a source of danger in injuries. In the year 1893–4, in the Bonn Eye Clinic, of 22 cases of serpent ulcer after injury by stone, 36 per cent. had dacryocystitis. In 18 cases of serpent ulcer from the quarries of the section, 3 eyes were blinded, and 3 saved with moderate light. In 4 of these 6 cases, which entailed costly results in benefit insurance, a blennorrhœa of the lachrymal sac was present.

In closing I desire to express the wish that all the unions would concern themselves for the protection of the workmen as much as this Section, No. IV., of the Quarry-Union, and further, that the question of protective spectacles from a professional standpoint would elicit more interest than it

seems to have done. I wish to express my thanks to Dr. Saemisch, my former instructor, for his assistance.

Thanks to the kind interest of Professor Snellen, the spectacles of my pattern are finding some use here in Holland. We are correcting the errors of refraction and presbyopia with the glass and modifying the thickness according to the work. Sometimes smoked glasses are useful, as in slacking white limestone, which strongly reflects light. In metallurgy colored protectors are frequently required.

AN ANATOMICAL CONTRIBUTION TO THE GENESIS OF CONGENITAL COLOBOMA OF THE EYE.[1]

By Dr. LUDWIG BACH.

PRIVATDOCENT AND 1 ASSISTANT.

(With Plate X. of Vol. XXXII. of German Edition.)

Translated by Dr. Selina Bloom, New York.

THOUGH our knowledge of the genesis of congenital defects has been decidedly furthered of late, especially through the studies of Carl Hess, and the monograph of Bock, we are still far from possessing an explanation of the different coloboma forms, which can be considered free from objections. The reason for this is their diversity of form, and, besides, the small number of these cases published in which an exact anatomical description has been given *early*—that is, a short time after the formation of the coloboma.

And yet it is necesary and desirable that just such early cases be examined in order to discover the cause of these defects. This is especially important, because many have accepted the theory brought forward lately, that coloboma originates in fœtal inflammation. Generally speaking, this question is the more difficult to decide, the later the case is submitted for anatomical examination. The reason for this difficulty lies in the fact that the inflammation may have occurred in an eye already affected with coloboma.

[1] From the University Eye-clinic, Würzburg.

As the question before us interested me, I have been in the habit of examining for some time past all the fœtuses of rabbits and all newly born rabbits I could obtain, in the hope of finding coloboma of the eye.

In the spring of 1895 my efforts were crowned with success. A rabbit which I was using for an experiment died in the narcosis. It is well known that gravid rabbits very often die in ether narcosis, and so I looked to see if this had been the cause of death here, and found four almost fully developed fœtuses, three normal and one other less pigmented and smaller than the rest. This last had coloboma in both eyes.

In the following, I shall first describe the two eyes separately, because they differ somewhat anatomically, and shall give afterward a summary of the more important points, with my view of the genesis of coloboma.

Microscopical description of the **right** eye:

The *cornea* is well developed in all its layers, although it grows gradually thinner from above downward, thickening slightly again at the lower border. The lower third of the cornea has thus about $\frac{2}{3}$ the thickness of the upper parts.

The *sclera* is normally formed in the upper half, whereas in almost the entire lower half it shows a cystic bulging, extending from the optic nerve to near the ciliary region. Unfortunately the cyst wall was cut into during the enucleation of the eye, making an exact description of wall and contents impossible. It was a narrow-necked cyst, analogous to that in the Schema II., of Hess, (*v. Graefe's Archiv*, Bd. xxxvi., p. 156), and its outer wall was greatly thinned. For a short distance the covering of the eyeball in the lower parts is composed almost entirely of sclera—that is, of embryonic connective tissue, the chorioidea and retina being missing here entirely.

The *anterior chamber* is still very narrow and a pupillary membrane still exists.

The choroid and the *pigment-epithelium* of the retina are missing in the entire inferior half of the ball. To a small extent, the ciliary body is absent, and to a still smaller degree the iris, or more especially its pigmentary layer. The existing parts of the iris are normal, its pigment layer well developed. In the ciliary

body there are no muscle fibres. The *ciliary processes* seem short compared with those of normally developed rabbits' eyes of the same period, particularly in the lower part of the globe.

The pigment layer of the iris and ciliary body is present to a greater extent than that of the retina. The epithelium of this layer is developed over quite an area, but the cells lack pigment. At the point where the pigment layer ceases to exist, it is bent over toward the front. The retina, too, shows a forwardly placed duplicature at its most anterior point, not only in the lower but also in the upper portion of the eye. This condition is found very often in the eyes of the newly born, according to Lang (Braunschweig), though not regularly. In the upper part of the eyeball, the pigment epithelium is normal; the choroid too is developed, although but little differentiated as yet.

The condition of the *iris* is quite *peculiar* in the *upper half of the eye.* A narrow strip of stroma, with its pigment layer, is all that exists thereof; at the pupillary margin, where the pigment layer alone is left, the iris is bent backward like a hook. The vessels of the pupillary membrane originate in the stroma.

The *retina* in the upper half and the greater portion of the lower half of the eye does not differ in its state of development from normal eyes of the same age. It shows but little differentiation as yet in its outer layers. A small portion of retina is missing entirely in the lower half, including for almost its entire extent the pigment epithelium, though for a small stretch this still exists minus the pigment. The only change in the retina of the cystic portion is the absence of the pigment layer.

There is absolutely no trace of *vitreous* present. The *optic nerve* is normal, and shows no sign of coloboma. *A conical strand of embryonic vascular connective tissue* extends from the optic nerve to the *lens*, to a point somewhat below its posterior pole, and spreads over the posterior surface of the lens in a fan-shaped manner. It can be followed still farther forward than the equator of the lens. A branch of it is given off in the region of the equator, and extends outward and forward to be inserted in the ciliary region.

The *lens* occupies almost the entire eyeball. In the central parts its fibres are no longer distinguishable; they consist of irregularly placed larger and smaller patches. In all other parts the fibres are well marked, especially so in the upper cortical region, where the *curved line* of *nuclei* is most beautiful. In the

lower parts, the nuclear arc is missing, though nuclei of lens fibres are visible here also.

In the anterior lower portion of the *lens capsule*, an increase in the growth of the capsule epithelium over a circumscribed area is to be seen, back of which the lens fibres have been destroyed and replaced by irregular, large, scaly masses.

At the *posterior pole* there is a *bow-shaped notch* in the lens. The notched part is filled with nodular masses, and is separated from the normal lens tissue by a sharp line of demarcation. Between normal lens fibres there are here and there isolated drop-like masses to be seen.

Between the pupillary membrane and the lens capsule there is a crummy mass. The same material is found on the posterior surface of the lens, between the lens and the fan-shaped vascular membrane, more in the lower parts than in the upper.

I have spoken before of the connection of this vascular membrane with the ciliary body. Where ciliary body, choroid, and pigment epithelium do not exist, a branch of this membrane extends forward from the equator into that embryonic tissue which forms the lower bulb-wall.

Not the least sign is to be seen of either a present or past inflammatory process.

Microscopical description of the **left** eye:

Here, too, there is a gradual thinning of the *cornea* in the lower parts, though to a lesser degree than in the right eye.

A mere narrow slit in the extreme periphery represents the *anterior chamber*, the lens touching the cornea in the other parts. Vessels between cornea and lens represent the *pupillary membrane.*

The *sclera* shows a cyst-shaped bulging below, extending from optic nerve to equator. This cyst is wide-necked, analogous to Schema III. in the above, quoted article by Hess. The sclera is very thin in this part.

Of the *iris* and *ciliary body*, only a small portion is missing in the lower part of this eyeball, and a somewhat larger portion of the *choroid*, whereas the *pigment epithelium* is missing in almost the entire lower half of the retina.

It is remarkable that the iris in this eye, that is, so far as it exists in the lower parts, should have a much broader surface than in the upper portion.

The *folds* in the anterior portion of the *ciliary region* are larger and more pronounced than in the right eye. Very little can be discovered here of development of a ciliary body, and nothing of a ciliary muscle.

Here, too, the pigment layer is bent forward where it ends behind the ciliary region, and here, too, a *vascular branch* of the vascular lens membrane extends forward toward the ciliary region, drawing this part backward somewhat.

The choroid is more highly differentiated in this eye, especially in the upper parts, though to some extent in the lower half of the ball also.

There is *no* defect in the retina in this eye. It shows folds in the cystic portion, but there are no changes to be found in the structure. In the other parts of the retina there are folds here and there, otherwise it is normally placed, has its inner layers well developed, while the outer are not differentiated as yet. The epithelium of the pigment layer contains no pigment in the lower half of the retina, that of the ciliary body and iris being pigmented. The retina forms a fold at the ciliary border just as in the right eye.

There is a greater destruction of lens fibres here, well-preserved ones and their nuclei being found only in the most anterior parts. Drop-shaped formations can be found everywhere between the fibres, and in some places there are rounded crummy masses instead of fibres. The nuclear arc is very indistinct below, and there is *no* sharply-defined *indentation* in the lens of this eye, though the destruction of lens-fibres is most marked just below the posterior pole. The *vascular membrane extending out from the optic nerve* and spreading over the posterior surface of the lens is thickest in the lower parts.

There is as yet no development of vitreous.

Not a trace of a new or an old inflammatory process can be seen.

For the sake of completeness, an exact examination of the brain and meninges was made. No inflammatory signs could be detected in them.

I wish briefly to extract and group together the most important and the more rarely observed points.

The *diminished thickness* of the cornea in the lower parts has never to my knowledge been described before.

The larger surface of *iris* found in the inferior half, as far

as it existed at all, was remarkable, compared to the upper parts, where it was still a narrow strip. It is of importance, further, in view of the theories as to the *origin of the iris*, that it was found well developed at points where no trace of a ciliary body or choroid could be found. It has been generally taken for granted that the iris is an outgrowth from the choroid, though Rumschewitsch declared it to have an entirely independent development. The conditions found in our case speak rather in favor of the latter view, though they do not exclude the former.

The *pupillary membrane* showed no interruption of continuity in either eye at the points where a defect in the iris existed, but was found at these points to extend from the embryonic tissue at the corneo-scleral junction, which was part of that tissue forming the covering of the eyeball.

There was not a trace of any *development of vitreous* in either eye.

In both eyes a vascular mass of embryonic connective tissue extended out from the optic nerve and spread itself over the posterior surface of the lens, causing at its point of insertion destruction of lens tissue. There existed, in the one eye especially, a beautifully outlined groove filled with a crummy mass which was sharply separated from the normal lens tissue. It is probable that later there would have been a resorption of these products of destruction and we should have had a real fissure before us. If the masses had not been absorbed, we should have found as a result a half-moon-shaped opacity of the lens.[1]

The lens occupies the entire interior of the eyeball, being fixed posteriorly by the above-mentioned strand of embryonic connective tissue.

Of interest, also, is that tissue-strand which branches off from the thickened lens-capsule in the equatorial region and extends to the ciliary body. This strand is inserted at the corneo-scleral junction in those places where no ciliary body exists. The *zonula Zinnii* had remained undeveloped as yet.

[1] I have indeed observed such an opacity of the lens once, and at the same time a persistent arteria hyaloidea. Twice have I seen an indentation of the lens covered by the lens-capsule in cases of coloboma of the iris, ciliary body, and choroid.

Signs of either a new or old inflammatory process were wanting.

Besides being interesting on account of these details, the case may claim importance for the reason that it was possible to examine it early, soon after the appearance of the coloboma formation, thus allowing the possibility of a decision of the question as to whether inflammation causes coloboma or not.

In neither of these eyes, however, was there the slightest reason for considering the coloboma formation a result of inflammation.

The symmetrical appearance, the sharply defined borders, and the limitation to a small area, almost excludes, to begin with, any thought of inflammation as an etiological factor.

In consideration of the importance of the question, I asked Professor Schultze, and also Professor v. Lenhossék, to examine the preparations. Both declared that not the least trace of an inflammation could be seen.

As a result, therefore, of what I have found, I must reject the assertion made by Deutschmann and others, that inflammation is the cause of coloboma formation. The presence of inflammation must be regarded as accidental, and as having no causal connection with the genesis thereof.

How then can the origin of the typical coloboma formation be explained?

Embryology has taught us that the development of the vitreous begins with the growing inward of a layer of true cellular mesoderm such as is found everywhere about the ocular vesicle. At the same time vessels develop in this layer, forming thus the origin of the vascular lens-membrane.

The vitreous, and the posterior part of this vascular capsule, are developments which go hand in hand. Later on there is an increase in the vessels, and at the same time growth of the tissue about it, the formation of the vitreous jelly.

In both above-described eyes the embryonic connective tissue has not been transformed into vitreous, but has retained the character of ordinary connective tissue. Thus a displacement of the borders of differentiation took place. From this connective tissue the tunics of the eye are de-

veloped on the one hand, and the vitreous on the other. A slight displacement of the border of differentiation between the external primary layers and those primary layers of the mesoderm which are converted into vitreous can, however, produce the above-described disturbance of development.

As a result of the discontinuance of the development of vitreous, the lens was held fast posteriorly by the strand, making the closure of the fœtal slit either impossible or delaying it, interfering thus as well with the development of choroid and sclera in the lower part of the eyeball.

The anatomically observed cases of coloboma of the *lens* thus far published are still relatively few in number, and our views of its origin but little cleared up as yet. The general view held thus far is, that it is due to a defective development of the suspensory ligament. This view, however, can not be correct. Development of the lens and zonula are entirely independent of one another, the zonula being developed from the vitreous tissue, from mesoderm, and not from ectoderm. Besides, the formation of the zonula occurs later than that of the lens. In both eyes here described, coloboma of the lens, or rather the supposed foundation of such a defect, is already present at a time when no trace of a zonula is yet visible. However, even if an imperfectly developed zonula had existed, it would be impossible to perceive or understand how the defect in the lens substance near its posterior pole—and this is the typical position of coloboma of the lens—could be explained by a defective development of the zonula.

My observations, as well as the almost fully confirming ones of Hess, Haenal, and Manz, point decidedly to a connection in the development of coloboma of the lens with the above described vitreous strand extending to the lens. Bock states, quite correctly, that the root of the explanation of the development of lens coloboma lies in the relation between the thickening of the ectoderm (lens formation), and the penetrating of the mesoderm into the fœtal cleft of the eye. That thickened ectoderm lying in front of the primary ocular vesicle sinks into it, and forces the mesoderm lying posteriorly, after it, to fill the free space still remaining in

the secondary ocular vesicle. Only when there is conformity in the time of development of these parts is a normal formation possible, particularly of the rounded surface of the lens and the hollow in which it lies.

As a sequence of the existence of the above-described conical strand, disturbances in the development of the lens, especially at its posterior pole, were to be expected for purely mechanical reasons.

Manz and others, particularly Bock, consider coloboma formation to be due entirely to the persistence of the blood-vessels which penetrate the fœtal cleft, and by an abnormal growth prevent the development of the other tissue formations.

The conception of Hess, which, in consideration of the result of my examination, I must accept, differs from that of Manz in that he allows the vessels but a secondary part in the causation of coloboma. According to him, the principal reason is a displacement of the borders of differentiation in the mesodermal formative tissue at the expense of the vitreous.

In the above discussion references to the literature have only been made where this was absolutely necessary. This has been done for the reason that the literature of the subject has been thoroughly considered in the articles of Hess, and particularly of Bock, in later years.

Description of the Drawing, Plate X.

Right eye. The drawing has been put together from several different preparations.

C. = Cornea, which grows thinner in the lower parts.

L. = Lens. The exact tissue relations have not been given here.

J. = Iris, which only exists as a narrow strip above.

Cp. c. = Ciliary body.

C. str. = Strand extending from the enveloping membrane of the lens to the ciliary body.

P. m. = Pupillary membrane.

K. b. = Nuclear arc of the lens.

L. k. = Coloboma or indentation of the lens. The indented part filled with different-sized masses and completely separated from the lens.

Scl. = Sclera.

Ch. = Chorioidea. It is still undifferentiated.

P. e. = Pigment epithelium of the retina.

R. = Retina. It is not fully differentiated as yet.

N. f. = Folds of the retina which lie in the scleral cyst.

Scl. c. = Narrow-necked scleral cyst.

B. L. = Band of connective tissue, which extends out into the scleral cyst.

N. o. = Optic nerve.

B. str. = Strand of embryonic connective tissue, which extends from the optic nerve to the lens, and spreads itself in a fan-shaped manner.

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REPORT OF THE TRANSACTIONS OF THE OPHTHALMOLOGICAL SOCIETY AT HEIDELBERG, AUGUST 4-6, 1898.

By Dr. ABELSDORFF (Berlin).

FIRST SESSION: THURSDAY, AUGUST 4, 9 A.M.

President: E. LANDOLT (Paris).

I.—NORMANN-HANSEN, Copenhagen. On **methodical conjunctival suture** as a typical mode of treating severe injuries of the eyeball. The speaker recommends that even penetrating wounds of the eye be treated with the conjunctival suture alone (without the buried scleral suture). He observed under this treatment either primary or secondary union.

In the *discussion*, VON HIPPEL, Sr., recommends that sclera and conjunctiva be so sutured that the scleral wound is covered by the conjunctiva.

II.—SIGRIST, of Basle: **The dangers of ligation of the common or internal carotid to the human visual organ.**

After a brief review of the known disturbances of the organ of vision as a consequence of ligating the common or internal carotid, which are found chiefly in surgical literature, the author reports two original observations, in which, as a consequence of ligation of the carotid, the sight of the corresponding eye was totally lost.

In the *first* case, an operation for the removal of a **carcinoma of the base of the tongue** was followed by profuse secondary hemorrhage, on account of which the common and internal carotid arteries were tied; shortly after this operation the corresponding eye became blind with the clinical picture of embolism of the central artery. Six days later patient died. *Autopsy*, together with microscopical investigation, revealed an ascending red thrombus in the internal carotid, starting at the point of ligation and extend-

ing into the cerebral vessels, about six *mm* of the thrombus projecting into the origin of the ophthalmic artery. While the rest of the lumen of this artery was free, there was demonstrated within the commencement of the arteria centralis retinæ a fully occluding embolus, upon which secondary thrombotic masses had been deposited, extending both centrally and peripherally as far as the point where the central artery enters the optic nerve. The reasons which spoke for embolism of the central artery were thoroughly estimated.

The investigation of the retina, which presents the first uncomplicated and well-preserved anatomical specimen of recent embolism of the central artery, showed that the pathological changes were located only in the inner layers of the retina. These changes are principally softening and serous imbibition of the layer of nerve-fibres; disintegration of the nerve-fibres into irregular droplets and myelin-like figures and degenerative changes in the ganglion-cells. While the fovea centralis as well as the choroid showed no morbid changes, the region of the macula exhibited, in addition to the changes already mentioned, a notable softening of the columnar layer. The anterior segment of the bulb showed a corneal infiltration propagated from the limbus to the centre, with a small central ulcer and peculiar epithelial alterations.

The *second* case was a young man with **traumatic pulsating exophthalmus,** whose external and internal carotids had been ligated. Complete blindness resulted with the ophthalmoscopic picture of embolism of the central artery. Five months later the ophthalmoscope showed an atrophic papilla with several thin vascular ramifications which did not extend beyond the papilla. The choroidal vessels were all visible, partly with almost normal color, the greater part, however, showing traces of commencing sclerosis; the entire fundus was covered with innumerable minute pigment-spots which surrounded the choroidal vessels. A year and a half later there was only about one-fourth of the fundus unchanged, corresponding to the region of the macula. The remaining three-fourths showed the whole of the choroidal vessels in full sclerosis and of a dazzling white, while in the unchanged region the pigment was still present as before in the finest points; the sclerosed region was free from pigment. The pigment was heaped up into larger aggregations at the margin of the sclerosed region, resembling choroiditic foci.

In the *discussion* NIEDEN and UHTHOFF emphasized the great

rarity of the cases depicted, and the harmlessness to the eye of ligation of the carotid. There also took part in the discussion AXENFELD—who once saw homonymous hemianopsia follow ligation,—SILEX, HIRSCHBERG, ZIMMERMAN, LAQUEUR, and PFLÜGER, who recommended caution in ligating the carotid in elderly individuals.

III.—AXENFELD of Rostock: **Histology and pathology of the lachrymal gland.**

The fact that the new-born cannot weep until about the sixth week is found stated only in the dissertation of Kirchstein (Berlin, 1894), and is explained there as follows: the lachrymal gland at this period is, in addition to its relatively small size, histologically still of an embryonal type, and on that account incapable of secretion; the tubuli are too little convoluted and branched, and between them there is a broad intermediate substance. The epithelia are said not to differ from those of the adult.

The author can see in the structure of the gland only a reason for a lessened secretion, not for a complete absence, since the epithelia are the principal factors. They exhibit in the new-born, as might be expected, the behavior of non-secreting albuminous cells, but show also delicate protoplasmic granulation and are not to be looked on as incapable of secretion. The speaker's discovery of the absence of the lymphatic intermediate substance and follicles can signify just as little from that standpoint because the lymphatic tissue is indecisive—there are glands, like the liver, in which it is wholly absent; and further, in more advanced age, the lymphatic tissue is considerably increased, although through the gradual atrophy of the epithelia the secretion is lowered. Aside from the epithelium only the blood-vessels and innervation are necessary to secretion.

As the blood-vessels are present in the new-born, there can be in the total histological proportion of the gland no complete explanation for the absence of secretion, but we must moreover assume a lack of innervation.

As the lachrymal nerve already shows a medullary sheath, and hence must be regarded as possessing conductivity, the central paths must be undeveloped, not only the cortical—which are requisite for psychical weeping,—but also the reflex paths, for reflex weeping is also absent in the new-born.

Concluding, the speaker discusses Darwin's explanation of the very peculiar fact that man alone is able to weep, and shows that

the absence of lachrymal secretion at birth lends no support to the theory of descent, but on the contrary stands before this theory as an unsolved difficulty.

IV.—HEINE of Marburg: **Changes in the shape and refractive index of the human lens after division of the zonula, with remarks upon the refractive-index of lenses of myopic eyes.**

As Tscherning and his pupils represent the view that the change in the shape of the lens during accommodation described by them could be explained only by traction of the zonula, the author undertook experiments upon the action of the relaxation of the zonula in the eyes of cadavers. First, the preliminary question as to whether the capsule of the cadaveric lens had the accommodated or unaccommodated form was decided in favor of the latter. After removal of the cornea and iris a radius of 13–14 *mm* could be measured, and after cutting out the zonula this was reduced to 8–10 *mm*.

With the zonula relaxed there was found at the anterior pole a softer albuminous body with a lower index (1.380) than with tight zonula (1.390). Hence in the latter case the computed total index is 1.430, while in the first case it is 1.440. This collection of a softer albuminous substance and the convexity produced by it at the anterior pole of the lens can also be brought about experimentally by relaxation of the zonula.

The speaker has proved by direct determination of the refractive index of lenses taken from highly myopic eyes, that the refractive index of the myopic eye is not increased.

An essentially raised index was found in a diabetic patient with a high degree of sclerosis of the nucleus of the still translucent lens. The myopia demonstrable by skiascopy was explained by the raised index alone. The axis of the eye was not elongated.

Discussed by SCHÖN.

V.—UHTHOFF, of Breslau: **Hallucinations of sight in affections of the visual organ.**

Uhthoff reports cases in which diseases of the eye called forth hallucinations without any disturbance of consciousness. A female teacher (who indeed had an hereditary psychical taint) with bilateral choroiditis saw foliage within the defect of the visual field, and a patient with opacities of the vitreous saw birds, angels, etc. In optico-neuritic atrophy, where excentric portions of the visual field were still intact, hallucinations were likewise

seen within the defect of the visual field centrally before the eye. In two observations of hallucinations in hemianopsia, the latter were limited to the affected half and did not trangress the middle line.

In the discussion HIRSCHBERG called to mind that von Graefe had performed neurotomy on account of hallucinations with bilateral shrinking of the eyeball; GOLDZIEHER reported cases of pathological persistence of images in choroiditis and lesions of the optic nerve; DORR mentioned a case as proof that hallucinations could be called forth by peripheral disturbances, in which the patient was cured of the hallucinations by enucleation of the affected eye after a prolonged sojourn in an insane asylum.

Further discussion by von Schroeder, Brugger, Rählmann, Michel.

VI.—E. VON HIPPEL, of Heidelberg: **On the clinical diagnosis of endothelial alterations of the cornea and their significance in the interpretation of various affections of the cornea.**

In the same manner in which epithelial defects of the cornea are recognized by the green coloration which arises when a solution of fluorescin is instilled into the conjunctival sac, it is possible when the epithelia are intact to demonstrate clinically endothelial defects in the depths of the cornea by the color which fluorescin produced. In addition to losses of endothelium it is possible to recognize changes which render the endothelium permeable. This may be proved experimentally.

By the aid of this method it can be proved that the so-called central parenchymatous corneal infiltration (Sämisch) originates in the posterior surface; on the other hand, keratitis parenchymatosa, which spreads inward from the periphery, is not occasioned by a primary endothelial affection, as far as may be maintained upon the basis of cases hitherto investigated.

Endothelial disease may further be demonstrated in buphthalmus.

Certain cases of congenital parenchymatous corneal opacities, especially those which clear up relatively quickly, are caused by penetration of aqueous humor into the cornea after permeability of the endothelium, without the presence of any sort of intraocular inflammation. In other cases an *ulcus corneæ internum* may be clinically demonstrated by the aid of this method.

Opacity in acute glaucoma and deep-seated corneal opacity in many cases of iritis also arise from penetration of the aqueous.

The endothelium may lose and regain its perviousness in a very short time.

In the discussion SCHMIDT-RIMPLER mentions that in the traumatic cataract of rabbits, when the swollen mass of the lens is in contact with the cornea, an opacity of the posterior corneal surface may be observed. The paper was further discussed by Hirschberg, Wagenmann, Leber, Schirmer, Mellinger, and Peters.

DEMONSTRATION SESSION, THURSDAY, AUGUST 4, 1898, 3 P.M.

President: Dr. AXENFELD, of Rostock.

1.—SIGRIST, of Basle: Demonstration of the subject of his paper, and also of a new ophthalmic operating-chair, together with certain apparatus for the operating-room.

2.—AXENFELD, of Rostock:

(a) Demonstration of **specimens** illustrating his paper on the **lachrymal gland.**

(b) **Syphilitic epibulbar pseudo-tumor** with typical tubercular structure.

Author demonstrated specimens and photographs of a woman who exhibited extensive ulcers of the skin of the right arm and sternum, a retro-pharyngeal swelling the size of a hen's egg, and an epibulbar tumor on the left side, which, at first, was taken for an epithelioma and was to have been enucleated, but after an exploratory excision, was held to be surely tubercular. The tubercles showed not only epithelioid cells and Langhans's giant-cells, but also central caseation. The author, in remembrance of a case of syphilis of the lid demonstrated at the last meeting of the Society, ordered anti-syphilitic treatment which brought about a cure of the tumor in two weeks and of the other lesions in about four weeks. Patient had not reacted to tuberculin, and inoculation of animals had resulted negatively. So rapid a resolution of such severe lesions warranted only a diagnosis of syphilis, and is a particularly distinct proof of the view that late syphilis and tuberculosis may present the same picture from a purely histological standpoint. On that account the differential diagnosis must be very cautiously made, and further investigations of typical bilateral parenchymatous keratitis are especially desirable.

3. GROENOUW, of Breslau: Demonstration of **nodular corneal opacities.**

These consist of small, round, gray opacities situated close beneath the epithelium, and chiefly at the central part, and may persist almost unchanged for a long period (eleven years in one case). Microscopically they exhibit a deposit of hyaline masses in the corneal tissue proper. There is further proliferation of corneal corpuscles.

4. VON HIPPEL, Jun., of Heidelberg: Demonstration referring to his paper on **corneal endothelium.**

5. BACH, of Würzburg, showed microscopical specimens and drawing of **axial cataract, lentiglobus posterior, a connective-tissue cord in the vitreous** which had persisted from the fœtal period, and was associated with an **anomaly of formation** of the papilla; also of the entrance of **the retinal vessels** in **anencephaly.**

6. PRAUN: Presentation of a case of **acromegaly.**

7. HESS, Jun., of Marburg, demonstrated microscopical specimens of **congenital total cataract.**

8. PFLÜGER, of Bern: Demonstration of **Hegg's color-perimeter.**

9. LEBER, of Heidelberg:

I.—Demonstration of anatomo-pathological specimens:

1. Case of **congenital internal ophthalmia** with the results of a bacteriological examination **in a goat** (experiments made in common with Dr. Addaris).

2. Specimens of several cases of **melanoma** and **melanotic tumor** of the **conjunctiva** and **orbit.**

3. Case of **glioma of the ciliary portion of the retina.**

II.—Presentation of a patient with hyperostosis of the orbital wall after incomplete exenteration of the orbit performed for **melanotic tumor.**

10. SCHNAUDIGIL, of Heidelberg: Demonstration of an unusual ophthalmoscopic condition.

11. HEINE, of Marburg: Demonstrated microscopical specimens of highly myopic eyes.

12. SCHANZ, of Dresden, demonstrated experiments with **yellow ointment.**

13. WEISS, of Heidelberg, demonstrated **celluloid spectacles.**

14. SCHANZ, of Dresden, demonstrated a new Zeiss **corneal microscope.**

SECOND SESSION : FRIDAY, AUGUST 6, 1898, 9 A.M.

President : Dr. MEYER, of Carlsruhe.

VII.—SILEX, of Berlin : On the **central innervation of the eye-muscles.**

Author sought to determine the centres of the eye-muscles experimentally. While the associated centres, *i. e.*, the ocular movement consequent on optical impressions or secondary to movements of the head, are situated in the region of the visual sphere in the posterior cerebral lobe and anteriorly in the front-brain, in the so-called neck-region, the so-called Hitzig's centre, which forms part of the centre of the facial nerve, appears to be the centre of the voluntary eye-movements. It is still a question whether or not all of the eye-muscles receive their innervation from this source ; the experiments point only to the abducens and superior oblique.

In a case of unilateral traumatic nystagmus, author assumed a lesion of Hitzig's centre, for by irritating the latter there appeared eye-movements of the contra-lateral side.

VIII.—BERNHEIMER, of Vienna : **On the reflex paths of the pupillary reaction.**

After investigations of the embryonal human brain, and experiments made on apes, the author advances the following propositions, which apply also to man :

1. The optic-nerve fibres partially cross in the chiasm.

2. Those which bring about the pupillary reaction (pupillary fibres) are also partially crossed.

This mass of fibres is evenly distributed. Each eye is connected with the sphincter-nucleus of the same side, and with that of the opposite side by fibres of the optic nerve.

The partially crossed "pupillary fibres" pass, together with the partially crossed optic-nerve fibres, through the entire optic peduncle, and are deflected toward the middle line only in the region of the corpora geniculata, to reach the sphincter-nucleus, which is situated in the anterior portion of the anterior corpora quadrigemina, beneath the aquæductus Sylvii.

3. Besides the connection of each eye with both sphincter-nuclei through the partially crossed fibres, both eyes are connected with each other by a central communication of both nuclei.

4. It is very probable that this central communication of both sphincter-nuclei is brought about by the anastomosis of the ganglion-cell processes (Golgi preparations) of the sphincter-nuclei, these nuclei being situated close together.

IX.—Bach, of Würzburg: **Experimental investigations upon the reflex centres of the pupil and the paths of the pupillary fibres.**

Author details experiments on cats and rabbits, which he instituted in order to determine the paths and the beginning of the so-called pupillary fibres. With this object in view exenteration of the eyeball and orbit, as well as enucleation of the eyeball alone, were made, and the brain was then investigated by the Marchi and Weigert methods. The relations of the optic tract to the superficial strata of the anterior corpora quadrigemina were properly determined, and in the rabbit also the opposite transverse peduncular tract; but, on the other hand, the direct relations of the so-called pupillary fibres to the nuclei of the ocular muscles could not be ascertained. After division of the optic nerve, no alterations could be perceived in the amacrine cells of the retina. Decapitation experiments upon apes, cats, and albinotic rabbits vouchsafed the fact that the reflex centre of the pupil is seated directly beneath the medulla oblongata in the cervical portion of the cord.

Based upon these results a new scheme of pupillary innervation was devised, according to which the possible seat of the lesion in the various pupillary disturbances was demonstrated.

In the discussion which followed papers VII., VIII., and IX., Heddaeus, Michel, Sigrist, Greeff, and Braunschweig took part.

X.—E. Hertel, of Jena: **Consequences of division of the optic nerve in young animals.**

Author made unilateral isolated divisions of the optic nerve in a great number of three-weeks-old rabbits, with the most careful avoidance of any sort of vascular lesion. It was his intention to ascertain in growing animals the degenerative changes of the retina, and the development of the eyeball after section of the optic nerve. About three weeks after the neurotomy, he noticed with the ophthalmoscope a beginning atrophy of the alæ medullares and the papilla, which was complete at the expiration of five or six months.

The rest of the fundus was normal, excepting a slight diminution of transparency of the retinal periphery. After twelve months of observation, this haze had increased in extent but not in intensity. Microscopically he found that the atrophy of the nerve-fibre layer was complete in six months; in the twelfth month the ganglion-cells had vanished with the exception of meagre remains. On the other hand, the supporting substance of

the retina showed a slight hyperplasia; the granular layer was as good as normal, even in the latest stages. The bacillary layers, however, exhibited distinct intimate changes, less indicative of degeneration than of proliferation. There was present a distinct elongation and detachment of the outer segments; the inner segments were likewise elongated and elevated, and often drawn out into finest fibrillæ.

The author has observed that the growth of the normal rabbit's eye is complete. The extent of the eyes of the rabbits operated on had only slightly increased, nevertheless a distinct difference in size could be noticed between the eyeball of the normal and that of the operated side. The ball of the latter was decidedly smaller, and the difference in volume was about one-third of the total increase of the different dimensions of the normal eye. The author assumed that the most probable reason for this diminution of volume was the loss of function after the section of the optic nerve, for vascular lesions, which might have had disturbances of nutrition as a consequence, had been avoided. He could also find no justification for the assumption that possibly a lesion of single ciliary nerves had influenced the growth of the eye through disturbances of the sympathetic, for vaso-motor disturbances of any sort were absent.

XI.—RÄHLMANN, of Dorpat: **On marginoplasty by transplantation of labial mucous membrane to remove trichiasis in trachoma.**

R. recommends in marginoplasty the transplantation of mucous membrane of the lip, because the similarity of its structure with that of the conjunctiva renders it especially capable of typical healing without the tissue undergoing any change. The procedure was demonstrated by microscopical specimens.

KUHNT has likewise seen permanently favorable results in transplanting broad shreds of mucous membrane.

GREEFF saw in relapsing trachoma that the places to which mucous membrane of the lip had been transplanted had remained free from relapses. FRANKE recommended transplantation of skin in the form of Thiersch's flaps. Thier, von Hoffmann, Wagner, von Krudener, Mayweg, Mittendorf, and Herzog took part in the discussion.

XII.—SCHMIDT-RIMPLER, of Göttingen: **On rodent ulcer.**

Sch. had an opportunity of microscopically investigating a rodent ulcer in a man aged thirty-one years, where a large portion of the cornea had been destroyed and the acuteness of vision

reduced to perception of light. A ring of vessels surrounded the ulcer, within which the deeper layers of the cornea were preserved in a characteristic way. The bacteriological investigation was negative; once before the enucleation a few cocci were found. Rodent ulcer must be strictly differentiated from the ulcus serpens; the former has no tendency to perforation, begins at the margin, and shows in its progress an uplifting of the epithelium. The etiology is obscure, treatment uncertain,—often fair results may be obtained by the thermo-cautery.

In the discussion VOSSIUS emphasized the rarity of rodent ulcer, and said that etiologically it was possible that trophic disturbances starting from the nerves might come into consideration; SATTLER held that the disease varied in frequency in different countries; PFLÜGER believed in the importance of removing the already detached epithelium and cauterizing the base; according to NIEDEN it was possible to demonstrate foci even in normally appearing tissues by the use of fluorescin. Further discussed by Schirmer, Axenfeld, Goldzieher, and Silex.

XIII.—HESS, of Marburg: **Experimental investigations on the intraocular pressure in accommodation,** and on **the range of accommodation in various mammals, according to observations made conjointly with** Dr. HEINE.

In the usual animals of experimentation, cats, dogs, and rabbits, the range of accommodation is so slight that absence of increase of pressure during accommodation admits of no conclusion as to the behavior of intraocular pressure during accommodation in general. In the animals mentioned the refraction was raised only about 1.5–2.5 D. by irritating the ciliary ganglion, as well as by local irritation. Apes and pigeons, on the other hand, had a range of accommodation of 10–12 D. In these latter animals, however, an increase of pressure during accommodation was not demonstrable, although the method applied was sensitive enough to show accompanying increase of pressure with each pulse-beat. Just as little was it possible to recognize a change in the calibre of the retinal vessels with maximum contraction of the ciliary muscle.

Discussed by Schön.

THIRD SESSION: SATURDAY, AUGUST 6, 1898.

President: Dr. DIMMER, of Innsbruck.

XIV.—VON HIPPEL, Sen., of Halle: **On complete congenital color-blindness.**

XV.—UHTHOFF, of Breslau: **Contribution to our knowledge of complete color-blindness.**

XVI.—PFLÜGER, of Bern: **Results of investigations upon a patient with complete color-blindness.**

VON HIPPEL'S patient, with total color-blindness, was a student, aged twenty years, who suffered from divergent strabismus of the right eye, but had binocular vision with the stereoscope. During binocular fixation the nystagmus, which was otherwise present, disappeared. The difference-perceptivity was normal. Bright red appeared the same as dark green, bright yellow like saturated blue. The spectrum was shortened at the red end, the brightest place being at 510 $\mu\mu$. Images of a moving, shining point were seen in the same manner as with the color-perceiving eye. The blind spot was of normal situation and size. A central defect of the visual field corresponding to the fovea was not demonstrable, but the fovea was superior in optical capacity to the periphery. v. H. claimed that these observations could not be harmonized with the König-Kries color theory, according to which the cones are absent in the totally color-blind eye, and in particular a blind spot must be present which corresponds to the fovea.

In UHTHOFF'S patient, a sixteen-year-old youth, with $V = \frac{1}{6}$ and strabismus divergens, no diminution of the acuteness of vision was demonstrable from the fixed point up to 7°, but then first appeared a continuous falling-off up to the periphery. Mixed red and green seemed to be five times as bright as blue and yellow.

It is worthy of note that a simultaneous disturbance of hearing was present. The acuteness of hearing was only $\frac{1}{3}$, and a strong tone appeared higher than a weak one, although the height of the tone remained the same.

PFLÜGER'S observations on a fourteen-year-old girl fully agree with the cases published by HESS and HERING. It is important to note that two other children of the family were color-blind. Consanguinity was evident in patient's ancestry.

In the discussion, KANN reported a case of acquired total color-blindness following an attack of cerebro-spinal meningitis. Acuteness of vision was reduced to $\frac{1}{10}$, and the spectrum appeared a colorless gray. The optic discs were hyperæmic. Six weeks later acuteness of vision and sense of color were normal, red and violet being the colors first perceived.

LEBER's view is that most cases of complete color-blindness may better be looked at as pathological than as merely physiological abnormities. Just as disturbances of the color-sense may persist after recovery from hemianopsia, we may conceive a bilateral congenital hemiachromatopsia.

Further discussed by Rählmann and Landolt.

XVII.—SATTLER, of Leipzig: **On a simplified procedure for the operative treatment of myopia** and its results.

SATTLER *extracted the lens on account of excessive myopia without making a previous discission.* With a curved lance an incision, 6–8 *mm* in length is made perpendicularly to the vertical meridian of the cornea, the anterior capsule is lacerated with a hook, and as much as possible of the lens—usually about two-thirds—is thoroughly removed with the Daviel curette. Reposition of the iris is easily effected. After instillation of atropine, Fuchs's wire-net is applied. In two cases in children a single operation sufficed, but it is not recommended to open the posterior capsule as was done in one of these cases. In the case of a woman aged forty-three years, it was necessary to perform a subsequent puncture for the removal of portions of the lens which had remained behind. We should be in no hurry to perform final discission. In this procedure (thus far 30 cases) neither corneal opacity nor glaucoma was observed to follow. Sattler mentions as advantages of this procedure the absence of irritation during the course of the treatment, rapid recovery, limitation to two operative interferences, slight post-operatory astigmatism. The operation offers no safety from retinal detachment. Nine cases of zonular cataract were operated upon in the same manner (VACHER has removed the lens on acccount of myopia with ordinary curved incisions from first to last).

In the discussion, HESS, Jun., observed that he had operated in the same manner twenty-five times and he agreed with the deductions of the author. HIRSCHBERG also refrains from preliminary discission and regards FUKALA's recommendation of a multifold operation as harmful.

XVIII.—LAQUEUR, of Strasburg: **A case of bilateral homonymous hemianopsia with preservation of a minimal central field of vision.** Results of an *autopsy.*

Patient, aged sixty-three years, having suffered for many years from persistent albuminuria and arterio-sclerotic heart-phenomena, suddenly fell ill with the clinical picture of left-sided hemianopsia.

Six weeks later he was suddenly struck with apparently complete blindness. A right-sided hemianopsia had been added to his former trouble, leaving central vision ($V = \frac{3}{4}$) essentially intact. The extent of the visual field amounted to 1° in width and 2° in height. The movements of the patient were as awkward as those of a blind man, as he had lost all perception of space.

After death, from cardiac paralysis, the macroscopic investigation of the brain (the microscopic is not yet completed) showed that the convex aspects of the cerebrum were normal, likewise the base, chiasm, and optic tracts. In one of the twigs of the left posterior cerebral artery, running medially, a thrombotic occlusion 10 *mm* long was discovered. On the right side the obliterated vessel was not found. Considerable alterations were present on the inner and outer surfaces of the hemispheres: dilatation on the right side in the calcarine fissure, and two-thirds of the cuneus with exception of the pulvinar, lingual lobe, and gyrus fusiformis.

It appears, therefore, that the calcarine fissure and its surroundings play an important role in these processes, but the lingual lobe ought also to be included (owing to lack of time, reading of the paper was interrupted).

Discussed by Drs. Uhthoff and Rählmann.

XIX.—Schön, of Leipzig: **The pathological anatomy of glaucoma prolapticum (?).**

In children the line of fusion of the pigment epithelium with the ciliary epithelium is exactly at the ora serrata. Blessig's hollow space is not present, and only exceptionally dentes retinales. In adults the formation of the latter is increased. Blessig's space is present, and the retinal teeth are developed in a high degree. The absence of any law in the arrangement points toward an acquired condition, a kind of stretching of the retina, the alterations being partly of a mechanical, partly of a subsequent inflammatory nature.

Discussed by von Hippel, Jr.

XX.—Dimmer, of Innsbruck: **On the course of the optic nerve, with demonstrations.**

D. had an opportunity to investigate the optic-nerve paths of a patient who died six weeks after enucleation of his *healthy right* eye, on account of an epibulbar epithelioma. The investigation (by Marchi's method) of the chiasm and crus cerebri showed: right optic nerve for the most part degenerated, left nerve normal. In the left tract extensive, in the right moderate

degeneration. Author sees here an irrefutable proof for the semi-decussation of the optic fibres. There are parts of the chiasm where there are crossed fibres only, others have only fibres of the same side, and there are others where mixed fibres are to be met.

The degenerated fibres enter into the corpus geniculatum externum ; in the pulvinar there was only slight degeneration present, and the basal ganglia were not affected. As those fibres which are separated from their ganglionic cells quickly degenerate, we must assume that the fibres which end in the corpus geniculatum externum are optic-nerve fibres, and that this ganglion stands in the first place as a terminus for the optic-nerve fibres.

Discussed by von Michel.

XXI.—von Michel, of Würzburg : **Thrombosis in the retinal vascular system, with demonstrations.**

M. discusses the clinical picture of thrombosis of the central artery, which may simulate embolism, and illustrates it by anatomical specimens. He distinguishes between arterio-sclerotic, marantic, mechanical, and septic thrombosis :

Case 1 was a man aged fifty-eight years with ophthalmoscopic appearances of right-sided embolism. Autopsy revealed atrophic kidneys and arterio-sclerosis. In the neighborhood of the entrance of the vessels into the optic nerve were endarteritic alterations, proliferation of the intima with narrowing of the lumen and arterio-sclerotic thrombosis.

Case 2 exhibited in a fifty-six-year-old woman the ophthalmoscopic picture of neuro-retinitis albuminurica. Death followed right-sided hemiplegia. Autopsy revealed hemorrhage in the peduncular ganglia of the left hemisphere, and atrophic kidneys. There was present on both sides a thrombus of the central artery at its point of entrance into the nerve, while the central vein was normal.

Case 3, a boy aged seventeen years, died with the phenomena of a cerebellar tumor. Ophthalmoscope revealed choked disc on both sides. In one eye were present numerous hemorrhages, and the visual acuteness was more markedly depressed than in the other eye. In the eye most affected a thrombus of the central artery was found, with partial thrombosis of a retinal vein.

Case 4 was a man of forty-five years, who died of general sepsis, and had a left-sided metastatic ophthalmia. The investi-

gation of the ball revealed necrosis of the cornea, iris, and ciliary body; in these parts and in the vitreous streptococci were found, there was hemorrhagic effusion at the inner surface of the retina, streptococcus-emboli in the optic nerve, and thrombosis of the central artery as far as the lamina cribrosa.

Discussed by Wagenmann.

XXII.—WINTERSTEINER, of Vienna: **On nævus and sarcoma of the conjunctiva.**

Conjunctival nævus is mostly pigmented, seldom free from pigment. The pigment is seated in the epithelium, especially in the basal cells, though also in the superficial strata, further in the alveolar connective-tissue framework, which surrounds the nests of nævus-cells, and in the cells themselves, and finally also free between the cells.

The epithelium over the nævus is almost always altered, often excessively thinned; in other cases it exhibits a tendency to proliferation inwards in the form of solid cones or hollow coils, which may be so voluminous that the tumor acquires a resemblance to an adenoma (nævus glandulosus conjunctivæ); these adenoid inversions of the epithelium undergo here and there cystic degeneration, and displace and compress the nests of nævus-cells. In the desquamating cells colloid contents are often found, which are cast out towards the lumen, and may give occasion for the formation of concrements within the cystic spaces.

Nævi occur on all parts of the conjunctiva with approximately equal frequency; sarcoma, on the other hand, which, according to the unanimous view of collective observers, originates in the black maculæ of the conjunctiva, has its seat more frequently in the region of the palpebral fissure (133 times in 160 cases) than in the conjunctiva tarsi or fornicis. This disproportion finds its explanation in the fact that the growth of the tumor is observed a shorter or longer time after a trauma of the globe, and, secondly, that the series of cases in which several pigment spots were present in the conjunctiva—although situated in the region of the palpebral fissure—degenerated into sarcoma, while those in the conjunctiva of the lid and transition-folds were not enlarged.

XXIII.—BAAS, of Freiburg: On the **Origin of phlyctenulæ.**

BAAS found in the cornea of an eye affected with phlyctenular inflammation circumscribed alterations in which a foreign tissue had penetrated Bowman's membrane from behind. As a fourth part of the basal membrane was still present beneath the epithelium, he concluded that an ectogenous infection could not be the

cause of phlyctenulæ, but only some one of the external occasions, which, on the ground of morbid quality of scrofulous tissues, could cause the cropping out of the characteristic efflorescence.

In the discussion LEBER observed that his results were also opposed to an ectogenous origin of phlyctenulæ.

Discussed also by Axenfeld.

XXIV.—VON ABELSDORFF, of Berlin: On the **Eye of the Malay, Mongolian, and Negro.**

While an entire series of investigations of the acuteness of vision of primitive peoples exists, there is a complete absence of information on the dioptric system of their eyes, the quality of which, however, essentially influences the degree of acuteness of vision. If measurement of the lens cannot be carried out, A. was nevertheless able to determine the corneal curvature in a series of individuals by means of Javal's ophthalmometer. In 35 Kirghiz and 10 Togo negroes the length of the corneal radius lay within the limits of the same in the European. If a difference was demonstrable between the horizontal and vertical meridians, the latter showed here, as a rule, the stronger curvature. As far as a general conclusion is admissible from a relatively small number of observations, there was a surprising number of eyes free from corneal astigmatism in comparison with results obtained in the culture-races: in the Kirghiz: 57.2 per cent., and Togo negroes 30 per cent. In the others the astigmatism was of a slight degree, and only in the case of one negro was a lowering of the acuteness of vision due to the same.

The refraction in the Javanese, Kirghiz, Ashantee, and Togo negroes was emmetropia or slight hypermetropia. Only one female Javanese had a myopia of 1 D.

Ophthalmoscopically it happened that of 33 negroes two had medullated nerve-fibres, a very high percentage in comparison with observations on Europeans. In the Javanese and negroes, who have in common, in contradistinction to the Kirghiz, a strong pigmentation of the skin and conjunctiva, there was often present in youthful individuals a sickle-formed corneal opacity in contact with the upper margin. A. regards this opacity as an unusually broad transgression of the sclera over the anterior surface of the cornea, this phenomenon being present to a slight extent in all individuals.

XXV.—GROENOUW, of Breslau: **Bacteriological investigations of the etiology of ophthalmia neonatorum.**

The investigations comprise forty cases of children a few days

old with conjunctivitis,—not only typical blennorrhœa, but also simple catarrh. The conjunctival secretion was utilized for the preparation of cultures in various nutrient media, and also investigated in cover-glass specimens. As the generators of conjunctivitis there were present gonococci in 14 cases, pneumococci in 5, staphylococcus pyogenes once, and bacterium coli 3 times.

Gonococci were demonstrated with certainty by cover-glass preparations. They were present only once in a pure culture in pus, otherwise invariably with other bacteria, and indeed with two, three, and even four different kinds, as once with pneumococci, three times with Friedländer's pneumonia bacillus, while the white staphylococcus and the xerobacillus were almost always present. After cessation of suppuration, gonococci could be found in the conjunctival sac; in one case this occurred twenty-five days after suppuration had ceased. It is to be recommended, therefore, that the treatment with nitrate of silver or a similar remedy should not be suspended too early lest a recrudescence ensue.

The pneumococcus did not engender the clinical picture of blennorrhœa in the five cases observed, but rather a milder or severer form of catarrhal conjunctivitis which ran its course within a few days. As the pneumococcus, as a rule, was demonstrated in cover-glass preparations, one may predict in these cases a rapid and favorable course of the disease, based upon microscopical investigation of the secretion.

The question as to whether or not the staphylococcus can engender a conjunctivitis is still debatable. Among the cases investigated was one in which the staphylococcus pyogenes aureus was present in an almost pure culture, and was therefore to be regarded as the exciting cause. White staphylococci were very often present, many times in great numbers; yellow cocci were not exactly infrequent, but for the most part in small quantity only, and it is very doubtful if any etiological significance should be ascribed to these germs.

The bacterium coli or a bacillus nearly allied to it could be regarded as the exciting cause of a catarrhal conjunctivitis or mild blennorrhœa in three cases.

In more than a third of all cases no typical bacteriological result was present. These cases consisted chiefly of milder or graver forms of catarrh, which either rapidly recovered or lasted up to six weeks. As a rule, white staphylococci grew in the cultures, also in many cases a few yellow cocci and xerobacilli.

In addition to the foregoing, the following non-pathogenic micro-organisms were found: micrococcus albus non liquefaciens, micrococcus roseus Bumm, white sarcinæ, and various bacilli. Diplobacilli and virulent diphtheria bacilli were not present in the cases investigated.

As to the clinical picture and its relation to the exciting cause of the disease, a typical bacteriological result was mostly absent in the mild and about half of the severe cases of catarrh. The remaining severe cases were engendered by the pneumococcus, staphylococcus, and bacterium coli; the milder cases of blennorrhœa by the gonococcus and bacterium coli. In the medium and severe degrees of blennorrhœa the gonococcus was chiefly present, and in only one case a degenerated form of the micrococcus luteus was the presumptive cause, the gonococcus being absent. It follows, therefore, that the clinical picture does not permit any certain conclusion as to the exciting cause.

In the discussion AXENFELD mentioned that an injection of Behring's serum brought about recovery in a new-born child with pseudo-membranous conjunctivitis in which he had found virulent diphtheria bacilli.

LEBER emphasized the uniform picture of blennorrhœa. Mixed infection certainly occurred, but the essential cause was to be sought in the gonococcus. SCHMIDT-RIMPLER and BACH maintained that blennorrhœa could undoubtedly occur without gonococci.

Hirschberg, von Hippel, Sen., and Franke also took part in the discussion.

The following papers were not read, but are to be published in the Report of the Transactions:

GREEFF: On acute retrobulbar neuritis.

FRANKE: Pemphigus and essential shrinking of the conjunctiva.

SCHANZ: On the so-called xerobacillus.

LANDOLT: Remarks on muscular advancement.

WEISS: On strabismus.

AXENFELD: On dislocation and removal of the eyeball as a form of self-mutilation of the insane.

SCHÖN: The etiological treatment of glaucoma.

WINTERSTEINER: On cysts and concrements of the conjunctiva.

On account of the International Ophthalmological Congress which meets next year at Utrecht, the next Heidelberg meeting will not be held until 1900.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FOURTH QUARTER OF THE YEAR 1897.

By Dr. ST. BERNHEIMER, in Vienna; and Profs. C. HORSTMANN and P. SILEX, in Berlin;

with the assistance of

Dr. S. M. Burnett, Washington; Dr. Dantone, Rome; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. P. von Mittelstädt, Metz; Dr. Sulzer, Geneva; Dr. L. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; Dr. Schiötz and Dr. Ole Bull, Christiania; Drs. Greeff and Deus, Berlin; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections XII.–XXI. Reviewed by Prof. SILEX.

XII.—IRIS.

426. Weill. Tuberculosis of the iris and ciliary body with demonstration of tubercle bacilli. *Arch. f. Augenheilk.*, xxxvi., p. 96.

427. Krassnizag. A case of gonorrhœal iritis. *Wojenno med. Jour.*, Nov., 1897.

428. De Wecker. Sphincterectomy of the iris. *Ann. d'ocul.*, Dec., 1897, p. 429.

429. Marshall, C. D. Sarcoma of the iris. *Trans. Ophth. Soc. Un. K.*, xvii., p. 30.

430. Bruns. Leprous iritis. *Amer. Jour. of Ophth.*, Dec., 1897.

To the few cases of tuberculosis of the iris in which it has been possible to find tubercle bacilli, WEILL (426) adds another in which a few bacilli were found after laborious searching. He recommends the staining method which he employed.

The purulent iritis appeared in KRASSNIZAG's (427) patient on the twenty-eighth day of a gonorrhœal urethritis. In the pus obtained by paracentesis, the gonococcus was found. The iritis ran a favorable course, and there was recovery with V = $\frac{20}{30}$. The synovial membranes, the endocardium, and the vessels remained normal. HIRSCHMANN.

MARSHALL'S (429) patient, a man aged twenty-one, three years before received a slight blow which did not injure the eye. There was a bulging iris and hazy cornea, T + 2. After iridectomy a large opaque mass presented itself, which could not be removed. The eye was excised. The mass was an unpigmented sarcoma, arising from the posterior surface of the iris. There are at present 22 cases on record, 11 pigmented. WERNER.

In two cases of undoubted leprosy seen in his clinic in New Orleans, BRUNS (430) saw an iritis of moderate grade. There was no other cause for the iritic inflammation than the dyscrasia. BURNETT.

XIII.—CHOROID.

431. MEISLING. On propagation of sarcoma from one eye to the other along the optic nerves. *Nord. med. Arkiv*, vii., i., 1, 1897.

432. LAGRANGE. Panophthalmitis cut short by a sub-conjunctival injection of cyanide of mercury. *Soc. d'anat. et de physiol. de Bordeaux. Ann. d'ocul.*, July, 1897, p. 46.

MEISLING (431) speaks of three cases of choroidal sarcoma in one eye followed (in one case twelve years later) by diminution of vision from extrabulbar causes in the second eye, due, as the author supposes, to propagation of the tumor along the optic nerves. SCHIÖTZ.

XIV.—GLAUCOMA.

433. v. HIPPEL. On congenital hydrophthalmus, with remarks on blood-staining of the cornea. *Graefe's Archiv*, xliv., 3, p. 539.

434. FORTUNATO. On sympathetic glaucoma. *Bull. d'ocul.*, xix., 1, p. 1.

435. LAVAGNA. On the employment of bromhydrate of arecoline as a myotic and an anti-glaucomatous agent. *Ann. d'ocul.*, Oct., 1897, p. 305.

436. WAGNER, M. Operative treatment of glaucoma. *Ann. d'ocul.*, Oct., 1897, p. 304.

437. CHIBRET. Sclero-cyclo-iridic puncture in the surgical treatment of glaucoma. *Ibid.*, Sept., 1897, p. 198.

438. DE SCHWEINITZ. Glaucoma three years after extraction of cataract by the combined method; contraction of the visual field with gradual loss of vision in spite of eserine and paracentesis of the cornea. *Ophth. Record*, Dec., 1897.

439. SMITH, PRIESTLEY. Diminished secretion as a factor in the causation of primary glaucoma. *Ophth. Review*, xvi., p. 199.

v. HIPPEL (433) examined the eyes of an infant four weeks of age with hydrophthalmus. He found marked distension of the cornea and sclero-corneal junction, deepening of the anterior chamber, almost total absence of Schemm's canal, signs of old irido-cyclitis, parenchymatous keratitis, ectropium of the pupillary margin, a small lens, hypertrophy of the zonula, and excavation of the disk.

FORTUNATO (434) speaks of some cases in the literature reported as cases of sympathetic glaucoma, and advises against haste in making such a diagnosis. He had seen a case of so-called sympathetic glaucoma in which another practitioner had enucleated the other blind eye without any effect on the glaucoma, which was checked only by an iridectomy.

The chief interest in DE SCHWEINITZ's (438) case centres in the fact that the glaucoma came on three years after the operation, during which time the patient enjoyed perfect vision and the eye was quiet. There was a small prolapse of iris in the angle of the wound. BURNETT.

The object of P. SMITH's (439) note is to draw attention to Czermak's view of the cause of the shallow anterior chamber which precedes a glaucoma. Although partly due to increased size of the lens in advanced life, and subnormal dimensions of the globe, he thinks diminished secretion from the ciliary processes is a very probable cause also. Czermak states that the anterior chamber is usually shallower in the predisposed eye than

in the glaucomatous eye. Smith remarks that subnormal tension has never been noticed to precede glaucoma, although it might be expected according to this view. WERNER.

XV.—SYMPATHETIC OPHTHALMIA.

440. MULDER. A case of sympathetic papillitis. *Zehender's klin. Monatsbl.*, xxxv., p. 413.

441. RUNK. A contribution to the subject of the genesis of sympathetic ophthalmia. *Inaug. Dissert.*, Würzburg, 1897.

442. BULLARD, W. L. A case of sympathetic ophthalmia following a successful cataract operation. *Ophth. Record*, Oct., 1897.

MULDER (440), on the ground of a personal observation, contends that sympathetic papillitis is always cured by enucleation of the other eye. The cause is sympathetic irritation.

Adhering to the ciliary-nerve theory, RUNK (441) reports a case of sympathetic ophthalmia which broke out twenty-four days after perforation of the other eye by injury in the ciliary region. The author believed hereditary syphilis to be the predisposing cause of the sympathetic ophthalmia, and when enucleation of the injured eye did not stop the process in the other, enunction treatment brought about an improvement in vision.

BULLARD (442) reports a case of acute mania and sympathetic ophthalmia after a perfectly smooth extraction with iridectomy. The trouble began some four weeks after the operation, after exposure to cold. The ultimate result as regards vision is not given. BURNETT.

XVI.—LENS.

443. MULDER. Anatomical examination of a case of lenticonus posterior. *Zehender's klin. Monatsbl.*, xxxv., p. 409.

444. BACH. A contribution to the histology and genesis of lenticonus posterior. *Arch. f. Augenheilk.*, xxxvi., p. 161.

445. BAAS. On peculiar crystalline globules in a cataractous lens. *Graefe's Archiv*, xliv., 3, p. 457.

446. SOURDILLE. Daviel's section according to authoritative texts. *Arch. d'opht.*, xvii., p. 657.

447. SCHIÖTZ. Cataract statistics. *Nord. Mag. f. Lageridsk. Forhandl.*, Christiania, 1897, p. 159.

448. SCHWEIGGER. Flap extraction downward. *Arch. f. Augenheilk.*, XXXVI., 1–2, p. 1. [Translated in full in these ARCHIVES, May, 1898. The present report is likewise translated because it is an unusually good abstract of the article.—H. K.]

449. KNAPP. Remarks on cataract extraction based on a large number of new cases. Ophth. Section, 12th International Congress in Moscow. *Wjest. Ophth.*

450. PFLUEGER. Prolapse of the iris in the extraction of senile cataract, and its prevention. *Zehender's klin. Monatsbl.*, XXXV., p. 332.

451. VELHAGEN. A case of pseudo-neoplasm in the interior of the eye after cataract extraction. *Centralbl. f. Augenheilk.*, XXI., p. 363.

By numerous experiments MULDER (443) has shown that traumatism of the eye has no effect on the normal development of the eyes of the progeny, although mutilation with simultaneous infection may have some such influence. In a series of experiments of the latter sort he obtained two rabbits with lenticonus posterior. The posterior capsule showed in its centre a small opening through which lens masses had protruded. With this there were associated retrograde metamorphoses.

BACH (444) found an opening in the capsule in a case of lenticonus which he believes to be the cause of the lenticonus, and the result of processes accompanying the absorption of the hyaloid artery and vascular sheath of the lens.

BAAS (445) found crystalline globules among the fibres of the nucleus of a lens. About a dark, round centre lay long crystalline needles arranged radially. They consisted perhaps of leucin.

SOURDILLE (446) proves by reference to hitherto unknown manuscripts that de Wecker and Sulzer are mistaken in believing that Daviel's section at first included $\frac{2}{3}$ or $\frac{3}{4}$ of the circumference of the cornea. It appears, from old letters and theses, that his section included half the circumference of the cornea.

V. MITTELSTÄDT.

SCHIÖTZ (447) reports on 100 cataract operations. In 1 case there was primary infection with panophthalmitis; in 5, secondary infection. In 3 of these the process was checked by the galvano-cautery; 2 recovered good vision, 1 counted fingers at two feet, and 2 were lost from panophthalmitis. In 4 others vision was lost from glaucoma, hemorrhage, or escape of vitreous.

The five cases last operated on were treated nearly in accordance

with Hjort's method with open wound, and this plan will be followed by him in the future, since it is an advance in the matter of after-treatment; and he believes that with it secondary infection will be less frequent. In order to prevent primary infection the eye must be kept clean in the way previously described. The lashes are pulled out several days before the operation, the conjunctival sac is washed out daily, or oftener, with physiological salt solution, and when the tear sac is affected it is split open and tamponed, as Schweigger has suggested. SCHIÖTZ.

After an historical introduction on the section in cataract extraction SCHWEIGGER (448) shows by statistics that the claim, that the combined extraction gives as good visual results as the simple, is false. He uses for statistical purposes the operations in his private clinic: 194 with, and 208 without, iridectomy. Losses in the former 3.6 %, in the latter 2.4 %. The vision was better after the operations without iridectomy (29 % had V = ½ - 1 as compared with 6 %). He prefers the section downward, using a Richter's knife as modified by him, and fixing the eyeball, not with forceps, but with a two-pronged fork. The after-treatment is the same whether iridectomy is done or not. Secondary cataract is divided with iridectomy scissors devised by Schweigger. For one sort of secondary cataract, the two-needle operation is still the best, viz., the cases in which iritis leads to the formation of new membranes, blocking the pupil. Prolapse of iris occurred in 12.5 % of the cases, and after iridectomy in 9.7 %. Excision was done 1–10 days after the discovery of the prolapse; no great disadvantage results from this. Anterior synechiæ also are not of great importance, since it is rare that glaucoma develops, or that purulent irido-choroiditis follows. In order to prevent prolapse, Kalt's corneal suture and Desmarres' conjunctival flap were used, but neither was followed by good results. In the last 100 operations, there were but 2 prolapses. After extraction, a 3 % solution of troppococaine is injected into the anterior chamber. The iris is then drawn out and pierced with a knife, close to the corneal wound, making an irido-dialysis. Eserine is then instilled. The cut in the iris heals without a trace.

KNAPP (449) gives briefly the characteristic features of the operation as he performs it and speaks of its results. The section is laid in the transparent margin of the cornea, upward, and a small conjunctival flap is made. The capsule is opened near the equator for 6 or 7 *mm* with a delicate cystitome, the lens

masses are extruded by pressure on the lower part of the cornea, the iris when protruding is returned with a bent sound. In 400 extractions, Knapp had iritis six times, irido-cyclitis twice, hemorrhage in the anterior chamber once, slow healing of the wound once, partial infection of the wound twice, suppuration of the cornea four times. Later prolapse of iris in 7.8%. Secondary operation in 40%, of which 38% comprised discission. For the last 10 years Knapp has made in 90% of all cataract operations, simple extraction without iridectomy, and in this way has obtained better vision, fewer losses, finer and more lasting eyes.

HIRSCHMANN.

In VELHAGEN'S (451) observation the eye of an old man, three weeks after a normal extraction, presented a large tumor projecting from its anterior part. This proved not to be a detachment of the retina or choroid, but a formation of vesicles beneath the epithelium of the ciliary body.

XVII.—VITREOUS.

452. BATTEN. Bilateral spontaneous hemorrhage (?) into the vitreous. *Trans. Ophth. Soc. Un. K.*, xvii., p. 58.

BATTEN'S (452) patient was a young man æt. twenty-six, apparently healthy. Heart and chest normal, bowels regular, no epistaxis. Later on, white patches and partial retinal detachments occurred.

WERNER.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

453. GLOOR. A case of congenital abnormal tortuosity of the veins of both retinas. *Arch. f. Augenheilk.*, xxxv., 4, p. 328.

454. ADAMÜCK. On traumatic degeneration of the retina. *Ibid.*, xxxvi., p. 114.

455. GOERLITZ. Report of a further case of chorio-retinitis striata. *Zehender's klin. Monatsbl.*, xxxv., p. 361.

456. MARKOW. Hyalitis striata and retinitis proliferans. *Wjest. Ophth.*, 1897, 4.

457. KASTALSKY. A case of bilateral coloboma of the macula lutea. *Arch. f. Augenheilk.*, xxxvi., p. 58.

458. BOAS. The anatomical basis of ring scotoma. *Graefe's Archiv*, xliv., 3, p. 642.

459. HERTEL. A contribution to our knowledge of retinal glioma. *Zehender's klin. Monatsbl.*, xxxv., p. 323.

460. MANZ. Clinical notes on bilateral homonymous hemianopsia. *Arch. f. Augenheilk.*, xxxvi., 1–2, p. 35.

461. ZIMMERMANN, W. A case of retinal detachment in a dog. *Zehender's klin. Monatsbl.*, xxxv., p. 346.

462. HORSTMANN. On the course of spontaneous detachment of the retina. *Arch. f. Augenheilk.*, xxxvi.

463. LAGRANGE. Detachment of the retina and electrolysis. *Soc. de méd. et de chirurg. de Bordeaux, Séance du 27 Mai, 1897; Ann. d'ocul*, July, 1897, p. 47.

464. BATTEN. Two brothers with symmetrical disease of the macula, commencing at the age of fourteen years. *Trans. Ophth. Soc. Un. K.*, xvii., p. 48.

465. LAWFORD. Embolism of lower division of central artery of retina. *Ibid.*, p. 55.

466. GRIFFITH, JOHN. A case of so-called retinitis punctata albescens. *Ibid.*, p. 51.

467. KNAGGS. A case of spontaneous recovery of a retinal detachment. *Ibid.*, p. 38.

468. HUBBELL. Hysterical or functional blindness. *Trans. Amer. Ophth. Soc.*, 1897.

469. MARSHALL, C. D. On subhyaloid hemorrhages. *Ophth. Record*, Nov., 1897.

470. THOMSON, A. G. Complete blindness, due to acute poisoning from over-use of Jamaica ginger, recovery followed by toxic amblyopia of the ordinary chronic form, with eventual atrophy. *Ophth. Record*, Nov., 1897.

ADAMÜCK (454) records the case of a school-boy of fifteen, into whose eyes flew small bits of copper, at the discharge of a gun. Ophthalmoscopically none of the fragments were visible. In a few weeks irido-choroiditis developed, followed by detachment of the retina, total in the left eye and partial in the right. The retina became reattached in the right eye. Nine years later, a contraction of the visual field was noticed, and there developed a number of white stripes in the retina, converging toward the macula and suggesting the picture of albuminuric retinitis. Twelve years after the injury, vision was reduced to $\frac{18}{200}$, and pigment deposits were found in the portion of the retina which

had not been detached. There was hemeralopia. Shortly after the patient died of typhoid fever.

GOERLITZ (455) reports in detail a case of retinitis striata, and accepts Casper's view that the stripes are due to coagulated masses forming beneath the retina after detachment. The choroid may be involved.

MARKOW (456) describes six cases of new formation of membranes in the retina and vitreous, and draws the following conclusions: 1. Some of these cases consist in new membranes in the vitreous following hemorrhage from small vessels in the vitreous which arise from the retinal vessels. In these the retina is not involved, according to Markow, and he would call them "hyalitis striata." 2. The usual cause is recurrent spontaneous hemorrhage. 3. When the macula is involved atrophic patches are usually formed. 4. In none of Markow's cases was the process dependent upon heart or vascular trouble. 5. Even in the eyes of the syphilitic, these new formations cannot be regarded as specific. 6. The name "retinitis" is applicable only when the retina is manifestly involved. HIRSCHMANN.

KASTALSKY (457) believed his case of bilateral coloboma of the macula to be due to developmental disturbances, since no other foci were found in the neighborhood.

BOAS (458) was able to show that ring scotoma depends upon a degeneration of the percipient elements of the retina, not dependent upon the retinal vessels but upon primary disease of the choroid.

HERTEL (459) reports that a glioma examined by him with the Golgi-Cajal method consisted of proliferated glia cells and a few ganglion cells among the fibres. The ganglion cells were of medium size and of various forms, mostly of angular outline with short processes.

MANZ (460) reports the case of a man, sixty-five years of age, who suddenly lost the right halves of his visual fields, and three years later the left. In both fields the point of fixation and a small tract above it were preserved, and in the course of time the fields grew larger. Color sense and orientation normal.

ZIMMERMANN (461) found as cause of retinal detachment a primary degenerative inflammation of the vitreous, the fibrillæ of which exerted traction on the retina. The sub-retinal albuminous exudation came from the vessels of the choroid.

In BATTEN'S (464) cases there was a definite history of syphilis

in the parents. The younger boy, æt. fourteen, had V = $\frac{6}{60}$; not improved by correction of H. As. The maculæ present red pear-shaped patches with fine retinal pigment, surrounded by ill-defined, yellowish-white spots. In the elder, æt. twenty-one, there was more advanced choroido-retinal disease with greater pigmentation. V = $\frac{6}{60}$, $\frac{6}{36}$ with − 1D. No scotoma, or contraction of fields in first case. Fields not examined in second. WERNER.

The chief point of interest in LAWFORD's (465) case is the field of vision. In addition to loss of the upper half, there was considerable contraction of the lower half (six days after onset). V less than $\frac{6}{60}$. A month later, V = $\frac{6}{12}$. Lower half of field normal. Lower division of central artery narrowed in all its branches. WERNER.

GRIFFITH's (466) patient, a man æt. forty-three, had suffered from night-blindness all his life. His parents were first cousins. V = $\frac{6}{36}$; not improved. Fields normal for white, also for colors except when light at all reduced. No scotoma. Disks pale, waxy. Whole fundus, but more especially round disk and macula, covered with discrete yellow spots. The president (Mr. Nettleship) thought that these cases did not get worse, as contrasted with the progressive nature of retinitis pigmentosa. Mr. T. Collins had seen a similar condition in a young lady whose parents were first cousins, and three of her brothers suffered from night-blindness. WERNER.

KNAGGS's (467) patient, a woman æt. twenty-one, received an injury to the eye (concussion) from a shot in the temple. There were two choroidal ruptures above and below the macula, some hemorrhages and retinal œdema. Two months later there was a wedge-shaped detachment of the retina, below, with the apex above. There was a corresponding sector-like defect in the field. Four months later it had disappeared, leaving only two or three small white spots at the periphery. Field normal except for central scotoma due to disease at m. l. (No record of V.!—L. W.) WERNER.

HUBBELL (468) reports three cases of monocular blindness coming on suddenly without assignable cause in women. There was no pathological change observed in the fundus, and the pupils were of normal size and responded to light. Vision was gradually restored. BURNETT.

MARSHALL (469) has demonstrated by an examination of an enucleated eye, that the blood in subhyaloid hemorrhages comes from a ruptured retinal vessel. BURNETT.

THOMSON's (470) case was a sailor of thirty-two years, who drank in two days a quart and a half of common Jamaica ginger. In four days he began to lose vision and in a day he was completely blind. The blindness lasted seven days, when sight began to return slowly, and in about four weeks was restored to a degree. Three weeks later he noticed a beginning failure, which has been progressive and now R fingers are counted at 1 metre, and L V = $\frac{1}{100}$. Disk is pale with atrophy of the papillo-macular bundle. There is a large central scotoma and restriction of fields for form and color, but irregular. BURNETT.

XIX.—OPTIC NERVE.

471. KNIES. On the course of the centripetal visual fibres in man up to the cortex of the occipital lobe, with remarks on a further case of bilateral homonymous cerebral hemianopsia with a small visual field preserved in each eye. *Zeitschs. f. Biologie*, xxxiv.

472. DOGELAISKY. A case of choked disk with restoration of vision after three weeks of complete blindness. *Wochenschr. f. prakt. Medicin*, 1897, No. 45.

473. TERSON. Partial atrophy of the optic nerves following a burn of the skin treated with iodoform. *Arch. d'opht.*, xvii., 10, 1897.

474. SCALINCI. On a myxo-sarcoma of the optic nerve removed with preservation of the ball. *Lav. d. Clinica Ocul. dell' R. Univ. di Napoli*, v., 2, p. 121.

475. SNELL. Hereditary or congenital optic atrophy and allied cases. *Trans. Ophth. Soc. Un. K.*, xvii., p. 66.

476. SNELL. A series of cases of optic atrophy following injury, chiefly of the anterior part of the head. *Ibid.*, p. 81.

477. GUNN and BUZZARD. Discussion on retro-ocular neuritis. *Ibid.*, p. 107.

478. KOLLOCK. A case of optic-nerve atrophy, treated with inhalations of nitrite of amyl. *Amer. Jour. of Ophth.*, Nov., 1897.

479. BURNETT, SWAN M. Completion of the history of "a case of tumor of the intervaginal space of the optic-nerve sheath," reported in the transactions for 1897. *Trans. Amer. Ophth. Soc.*, 1897.

480. Roy, Dunbar. The effect of intense flashes of electric light upon the eye. *Amer. Jour. of Ophth.*, Dec., 1897.

Terson's (473) patient, a woman of forty-eight, suffered an extensive burn of the skin of the arms, abdomen, and thighs, which was treated with iodoform. After three weeks of this treatment vision began to fail, and later there was partial atrophy of the nerve with R V = $\frac{1}{3}$, L V = $\frac{1}{6}$. There was a central color scotoma with free periphery of the field. There were no signs of general intoxication. The author refers to the changes in the optic nerve and retina which follow extensive burns, and which are, for the most part inflammatory, although partial atrophy of the nerve may come on as in intoxication amblyopia. This case, however, was one of pure intoxication with iodoform, which has been observed by others. v. Mittelstädt.

Snell's (475) cases are very complete, and the family histories carefully followed out. They are described as follows: Amblyopia (congenital) in three brothers and two sisters; amblyopia in two brothers; amblyopia in two brothers and a cousin; amblyopia in two brothers and a sister; amblyopia in three brothers—smokers. The cases range themselves in three groups: 1. Congenital amblyopia, unchangeable, color blindness. Good fields, no scotoma, vision better at night. Disk pale. One patient with normal V was color-blind. 2. This is the largest group, and corresponds to the class described by Leber as hereditary optic atrophy. Age of onset eighteen to twenty-three. Headache and epileptic attacks sometimes present. Central scotoma in some cases. In others, contraction of the field, contrary to what Leber found. The author mentions that he has met with three instances of failure of vision in young men shortly after marriage. In this group the cases resembled those described by Edgar Browne, vol. viii., p. 235, in these *Transactions;* they were all smokers. Mr. Nettleship had recorded cases like those in Group 1.

Werner.

Snell (476) records 18 cases; the first 4 were due to direct injury, and in 2 the lesion was probably in front of the entrance of the central artery, as the pallor of the disk appeared almost immediately after. In the remaining cases an interval elapsed between the injury and the decoloration of the nerve; 7 of these cases were injuries to the eyebrow, 1 injury of the molar region. Injuries of the frontal, parietal, and occipital areas are also represented. In Case 15 the left optic nerve became atrophied,

although the injury was on the right frontal region ; there was some depression of the bone and loss of smell, and evidently fracture of ethmoid. The author notes that in Treve's *System of Surgery*, out of four illustratiôns of fracture from blows on frontal or occipital region, the optic foramen is involved in three. Absence of ecchymosis of skin or conjunctiva cannot exclude basal fracture. In one case there was bilateral paralysis of the sixth nerve, but they recovered almost completely. As the atrophy may not appear for some weeks, one should be cautious in fixing an opinion from a medico-legal point of view when blindness results from a head injury, more especially as the pupil may react to light and the fundus be normal, although the patient says he is blind. Some fractures are liable to be overlooked in post-mortem examinations unless the dura mater be stripped off.

Mr. Lindsay Johnson has seen instances of optic atrophy from head injuries in animals, *e. g.*, a crane, a leopard, a bear, and a kangaroo. WERNER.

Two evenings were devoted to this discussion, which occupies 110 pages. It was opened by Mr. GUNN and Dr. BUZZARD (477). Mr. Gunn stated the prominent features of these cases to be: Rapid failure of vision, usually in one eye only, often accompanied by pain and tenderness in the neighborhood, absence of ophthalmoscopic changes, and a tendency to recover. They are distinguished from one-eyed hysterical amblyopia in that, in them, the pupil reaction to light is impaired. In injury to the retina from exposure to excessive light, there is also failure of central vision, perhaps in one eye ; but here the history, the micropsia, and occasional slight changes at the macula assist in the diagnosis. If neuritis is visible it differs from ordinary neuritis, in the early failure of vision, the central scotoma, and the subsequent pallor of the temporal half of the disk. The early failure of vision is due to the constricting action of the nerve sheath or optic foramen, and the central nature of the scotoma is accounted for by the fact that the macular fibres are physiologically most active, and regeneration after action is most readily impeded in them. Color defect is the most delicate test for impaired conduction. Occasionally there is slight concentric contraction of field as well. Pain on movement does not often indicate the side of the nerve involved. Visual acuity is worse in bright light. At times patients complain of letters appearing to move when reading ; this may be due to imperfect isolation of the axis-cylinders,

the current escaping from one to the other. There is defective light sense.

The optic nerve may suffer in orbital cellulitis, or periostitis in the optic canal, in disease of the sphenoidal sinus (Holmes's case) alone, or associated with disease of the nasal mucous membrane. The author had seen cases of recurrent amblyopia, with great pain and vomiting, analogous to ophthalmoplegic migraine. A well-marked history of gout is common in retro-ocular neuritis with tendency to recurrence.

There are two forms of the disease: one chronic, gradual, bilateral, *e. g.*, tobacco poisoning; the other acute, often unilateral, from gross local lesion, *e. g.*, rheumatism, gout, syphilis, fevers, influenza. Some cases of retrobulbar neuritis of ophthalmologists may, as stated by Dr. Buzzard, be really disseminated sclerosis in an early stage.

Buzzard dealt with retrobulbar neuritis occurring in disseminated sclerosis. In nearly 50 per cent. of the cases pallor of one or both optic disks occur; sometimes he noticed a red-gray injection of the disk. Some cases of sclerosis simulate hysterical paralysis at the beginning, and the symptoms may disappear and recur after a great many years; in these cases pallor of the disk is often present and important from a diagnostic point. The vision is very good in proportion to the pallor. This fact and the remissions of symptoms show that the nerve fibres are not affected in the beginning. The amblyopia is often transitory. Peripheral contraction of the field is not uncommon and may be monocular and simulate hysterical amblyopia. Paralysis of one or more limbs with spontaneous recovery and tendency to recurrence, together with amblyopia accompanied or not by pallor of disks, and exaggerated reflexes, constitute a very important group of symptoms.

Sir W. Gowers thought that tabetic atrophy of the optic nerves was not distinguishable from that due to sclerosis microscopically or otherwise. Retro-ocular neuritis at the chiasma may simulate intracranial tumor.

Berry was not satisfied that the classical symptoms indicated retrobulbar neuritis, either in sclerosis or toxic amblyopia. Recovery is rarely so complete that a central color scotoma cannot be found.

Hill Griffith summarized from twenty-seven cases. Direct reflex action of the pupil was retained in all except where no p. l.

Pain occurs early and disappears rapidly. Vision fails rapidly. In none was there total blindness.

Cross was struck by the large number of cases for which no cause could be assigned. He records five cases.

Little records a case of total blindness in both eyes, lasting for three weeks; no pupil reaction. It ended in recovery with pale disks. V R $\frac{6}{6}$, L $\frac{6}{15}$.

Various other members took part in the discussion. Frost records thirteen cases. WERNER.

KOLLOCK's (478) patient was a man who used tobacco constantly and drank some. Atrophy of the right nerve with V = $\frac{15}{200}$. Inhalations of nitrite of amyl brought it up to $\frac{15}{30}$ −, and after an inhalation each day for four days it increased to $\frac{15}{30}$ +, and remained so. There was no constriction of the visual field or scotoma. The abandonment of tobacco and alcohol had been previously tried, with no effect. BURNETT.

The case whose history BURNETT (479) has completed was one of myxoma of the optic-nerve sheath, containing only a few round cells. About two years after enucleation of the eye and tumor, there was exophthalmus and blindness of the other eye, ending finally in paralysis of muscles of the neck, right arm, and leg, and finally death. There was no return in the orbit of the eye originally affected. BURNETT.

ROY (480) reports two cases in which the eyes were exposed to an intense electric light. In both there was first a sudden and complete blindness, which passed away in a few moments. The principal complaint was of pain and redness of the eyes, a circumcorneal injection, and haziness of the cornea, accompanied with photophobia. The pupils are always contracted. All the symptoms reported in these and similar cases appear to the reviewer to be due to a burn of the epithelium of the conjunctiva and cornea by the intense heat, exfoliation of the discharged epithelium exposing the nerve filaments, with the attendant pain and photophobia. BURNETT.

XX.—INJURIES; FOREIGN BODIES (PARASITES).

481. MÜLLER. On the treatment of extensive perforating injuries of the ball with sutures. *Inaug. Dissert.*, Giessen, 1897.

482. HANSEN. On contusion of the eyeball. 12th Internat. Congress, Moscow. *Arch. f. Augenheilk.*, XXXV., 4, p. 333; *Ann. d'ocul.*, 1897, p. 195.

483. HIRSCHBERG. Report on my magnet operations in the year 1896. *Deutsche med. Wochenschr.*, 1897, No. 31.

484. BJERRUM. A case of foreign body in the eye. *Hospital-tidende*, No. 51, p. 1213.

485. LAWS, W. G. A case of temporary myopia following a blow in the eye. *Ophth. Review*, xvi., p. 204.

MÜLLER (481) reports from the Giessen clinic 80 cases of perforating injury of the ball treated with sutures. In 61 patients the ball was preserved; in 17 it was enucleated later, six times for suppuration in the vitreous, and in the other cases for foreign bodies, rupture of the posterior pole, etc. Sutures prevent loss of vitreous and secondary infection, and secure a smooth union of the edges of the wound, thus shortening the healing process.

HIRSCHBERG (483) reports 12 magnet extractions done in 1896. In every case the splinter of iron was removed without difficulty, although subsequent enucleation was necessary in 2. Visual results were good.

BJERRUM'S (484) patient had had a splinter of iron in the vitreous for six weeks, and a traumatic cataract had developed. With Haab's magnet the splinter was drawn forward, the lens was then removed through a linear section, and the point of a small magnet being introduced into the anterior chamber, the foreign body was removed without loss of vitreous.

LAWS'S (485) patient, a woman æt. twenty-nine, had been struck in the eye by a ginger-beer cork. After the pain and swelling had subsided she could not see so well. When seen seven days later there was slightly dilated pupil, good reaction to light, small hyphæma, ant. chamber shallower than in the left eye. T–1. Refraction -6 at m. l., $V = \frac{5}{12} - 6$. Left eye Em., $V = \frac{5}{5}$. Treatment: rest, atropine, and blisters. Two days later, $V = \frac{5}{12} - 2$, and two days after this, $V = \frac{5}{5} + 0.5$. WERNER.

XXI.—OCULAR AFFECTIONS IN GENERAL DISEASES.

486. LAQUEUR. On hereditary affections of the eye. *Zeitschr. f. prakt. Aerzte*, 1897, No. 1.

487. OSTWALT. Intra-ocular complications of cyclic albuminuria. *Wiener klin. Rundschau*, 1897, No. 41.

488. RAUDNITZ. On spasmus nutans. *Jahrb. f. Kinderheilk.*, xlv.

489. AVERENGHI and BEDUSCHI. Clinical contributions to acromegaly. *Ann. di Ottalm.*, xxvi., 4, p. 323.

490. DREYER-DUFER. Meningitis of ophthalmoplegic form. Its early diagnosis. *Arch. d'opht.*, xvii., 11, p. 689.

491. TERSON. Meningitis of ophthalmoplegic form. Its early diagnosis. *Ann. d'ocul.*, Nov., 1897, p. 385.

492. SCHWARZ. The significance of ocular disturbances in the diagnosis of diseases of the brain and cord. A monograph. S. Karger, 1898.

493. THOMSEN. On the diagnostic value of the prodromal symptoms which precede general paresis. *Internat. Congress f. Neurologie, Psychiatrie*, etc., Brussels, 1897.

494. PANTOPPIDAN. A case of bitemporal hemianopic scotoma. *Hospitalstidende*, 1897, No. 33, p. 777, Copenhagen.

495. WOLFFBERG. A case of chronic aconitine intoxication. *Wochenschr. f. Phar. Hygiene d. Auges*, No. 9, 1897.

496. NOYON. Ocular disturbance from incandescent gas-light. *Geneesk. Tydschrift*, ii., p. 1058, 1897.

497. DALLWIG. On torticollis in cases of hyperphoria. *Arch. f. Augenheilk.*, xxxvi., p. 103.

498. HAUPTMANN. A case of progressive traumatic paralysis of the 3d–7th pair of nerves. *Inaug. Dissert.*, Greifswald, 1897.

499. VOLARE. Clinical and pathological contribution to tuberculosis of the eyeball. *Lav. d. Clin. Ocul. d. R. Univ. di Napoli*, v., 2, p. 177.

500. DE SCHWEINITZ. Development of myopia as an ocular symptom of diabetes mellitus. *Ophth. Record*, Dec., 1897.

501. CONKEY. Panophthalmitis and meningitis accompanying *la grippe*. *Ibid.*

502. RISLEY. Two cases of marked and rapid change in refraction in patients suffering from glycosuria, associated with variations in the amount of sugar secreted in the urine. *Trans. Amer. Ophth. Soc.*, 1897.

An hereditary cause for diseases or malformations of the eyes was found by LAQUEUR (486) most frequently with retinitis pigmentosa and congenital cataract, and less frequently with albinism, total and partial irideremia, microphthalmus, juvenile cataract, coloboma of the macula lutea, ectopia lentis, extreme myopia,

and buphthalmus. Retinitis pigmentosa can almost always be traced back to consanguinity of the parents [a grossly exaggerated statement.—H. K.]. Congenital cataract is mostly due to direct transmission, and in albinism and congenital buphthalmus consanguinity plays the chief role. Congenital malformations of the iris are transmitted from generation to generation.

OSTWALT (487) makes the following statement: 1. Changes in the vessel walls play an important role in the production of cyclic albuminuria. 2. The vascular disease frequently precedes the outbreak of Pavy's disease. 3. The affection of the vessel walls appears to be the result of anomalies of metabolism (oxyluria, etc.). 4. In consequence of the functional insufficiency of the vessel walls, albumen passes into the urine as soon as the vessels of the kidneys are under unfavorable hydrostatic conditions. 5. The vascular affection can lead to pathological changes elsewhere than in the kidneys, either in the form of hemorrhages or in the form of perivascular foci of inflammation.

Under the name spasmus nutans, according to RAUDNITZ (488), are included two diseases of children, one a severe epilepsy, and the other having as chief symptoms bowing, shaking, and turning movements of the head, associated later with nystagmus. Most of the infants studied by Raudnitz lived in dark hovels, and the nystagmus diminished when they were kept in lighter quarters. He therefore concluded that this nystagmus is genetically similar to that of miners, and he discusses the probable manner of its production.

DREYER-DUFER'S (490) patient was a woman of twenty-six, who three days before seeking medical advice was suddenly attacked with severe headache, vomiting, and swelling of the right upper lid. After the sudden disappearance of the swelling, three days later, diplopia was noticed. A low degree of fever continued, with constant headache, and there was paralysis of the right levator, externus, and obliquus superior and inferior. The pupils were of equal size and responsive. Toward the end a left abducens paralysis came on while the right disappeared. Ophthalmoscopically a marked venous hyperæmia was found in both eyes. The diagnosis, which at the beginning of the disease when a unilateral ophthalmoplegia existed, was very difficult, was made certain by the marked dilatation of the veins, which, contrary to the condition in chronic brain disease, were not tortuous. The existence of this condition is the best indication of meningitis in doubtful cases.

V. MITTELSTÄDT.

SCHWARZ (492) was well prepared to write this monograph, by his literary researches and by his long service in the neurological department of the Leipsic policlinic. Diagnosis is especially considered, and hysteria is treated of in great detail.

THOMSEN (493) describes as the eye symptoms the Argyll-Robertson pupil, Westphal's symptom, transitory ophthalmoplegias, paralytic attacks, and atrophy of the optic nerve, which often come on years before the beginning of the general paralysis.

The disease in PANTOPPIDAN'S (494) case lasted for six years. It began with giddiness, headache, and vomiting. Later a large scotoma was found in each temporal field. Central vision failed gradually, while the temporal defects remained about the same. At the autopsy a sarcoma of the base of the brain was found, lying in the median line and extending from the pons to the chiasm.

SCHIÖTZ.

WOLFFBERG'S (495) patient, after taking aconite pills for seven weeks, suffered a paresis of accommodation requiring + 1.5 D for its correction.

NOYON'S (496) patient, aged thirty, complained of pain, photophobia, and mucous secretion. The visible conjunctiva of the ball was very red and chemotic. The conjunctiva of the lids and the portion of the bulbar conjunctiva covered by the lids was normal. Eyes otherwise normal. This inflammation came on after working all day with an incandescent gaslight. It was cured by abstaining from work, and was prevented later by wearing colored glasses. WESTHOFF.

DALLWIG (497) reports on two cases of functional torticollis, *i. e.*, that form of twisting of the head for the purpose of seeing single when hyperphoria exists. Correction of the muscular trouble and the wearing of a brace are the therapeutic measures to be employed.

The paralysis in the case reported by HAUPTMANN (498) was due to the kick of a horse which caused a fracture of the base of the skull, extending from the sella turcica through the cavernous sinus and the petrous bone.

DE SCHWEINITZ (500) reports two cases of increase in M. in patient suffering from diabetes. In one the fundus was normal, in the other there was œdema of the choroid and hyalitis. The increase of refraction was from 1.75 D to 5 D. BURNETT.

CONKEY (501) reports a case of panophthalmitis of the right eye which came on soon after an attack of grippe, and was accom-

panied later with meningitis, from which the patient died. No autopsy was allowed. BURNETT.

In RISLEY's (502) cases, both glycosurics, the refraction of the eye changed as much as 2 or 3 D in a short time. The presence of the sugar seemed to increase the refraction, requiring diminution in the power of the glasses that had been satisfactory when the sugar was less. BURNETT.

APPOINTMENTS.

Privatdocent Dr. E. V. SCHWARZ, in Leipzig, has been appointed extraordinary professor.

Dr. EMIL DE BERGER, Paris, has been elected foreign corresponding member of the Belgian Academy of Medicine.

Dr. VAN MILLINGEN has been appointed professor of ophthalmology at the Military Medical School of Constantinople.

Dr. L. BELLARMINOFF, professor of ophthalmology at the Military Medical Academy of St. Petersburg.

Dr. E. VON GROSS, adjunct professor to the chair of ophthalmology at the University of Budapest.

Dr. PESCHEL, extraordinary professor of ophthalmology at the University of Turin.

Dr. WM. CHEATHAM, professor of ophthalmology, otology, and laryngology at the reorganized Louisville Medical College.

Dr. S. C. AYRES, professor of ophthalmology at the Medical College of Ohio, the Medical Department of the University of Cincinnati.

Dr. P. N. K. SCHWENK, attending surgeon to the Wills Hospital, Philadelphia, in place of Dr. E. Jackson, resigned.

Dr. JOHN P. DAVIDSON, late house surgeon at the New York Eye and Ear Infirmary, professor of ophthalmology, otology, and laryngology, to succeed Prof. E. M. Shields, deceased.

DEATHS.

Dr. J. E. MURRELL, of Little Rock, Ark., died June 26, 1898, in his 49th year.

Dr. ROBERT TILLEY, of Chicago, June 1, 1898.

Prof. STEINBRUGGE, Ziesen.

BEQUEST.

An endowment of $25,000 to Harvard Medical College, by the late Dr. HENRY W. WILLIAMS, of Boston.

CORRECTION.

The following letter, correcting a mistake in the report of the Trans. of the Am. Ophthalm. Soc., published in the July number

of this volume, p. 455, has been received. As mistakes and inaccuracies in reports of societies are liable to occur, we shall promptly correct them if the authors will kindly bring them to our notice.

NEWARK, N. J., *August* 30, 1898.

MY DEAR DR. KNAPP:

I am so sorry there was a wrong report given of my case of "sympathetic inflammation," in the ARCHIVES. The case was one of sympathetic inflammation caused by adhesion of the scar in the lid to the end of the nerve after enucleation—and the inflammation subsided immediately after *severing the bands of adhesion*, and not amputation of the stump. The case to me was unique.

Ever yours,

T. Y. SUTPHEN.

Contents of the Archiv für Augenheilkunde (German Edition of these ARCHIVES) since our last report in the March number, p. 253 of this volume.

Vol. XXXVI., No. 4. Issued March, 1898.

21. RAMBOLOTTI, GIACOMO (Milan). Lymphangioid elephantiasis of the eyelids.

22. GRUNERT, KARL. The dilatator of the pupil in man.

23. NAGEL, G. Two cases of specific chorio-retinitis.

24. MARKOW, J. (Charkow, Russia). Obliterating central diffuse endarteritis of the retina.

Systematic Report on the third quarter of 1897. C. (Translated.)

Vol. XXXVII., No. 1. Issued May, 1898.

1. STRAUB, M. (Amsterdam). Pathological new-formation of blood-vessels.

2. SACHS, MORITZ (Vienna). Ocular paralyses.

3. KIMPEL (Marburg). Bilateral coloboma of the macula lutea.

4. BERNHARD, PAUL (Chur, Switzerland). Case of malposition of the yellow spot and partial coloboma of the choroid.

5. BACH, L., and NEUMANN (Würzburg). Bacteriology of eczematous kerato-conjunctivitis and catarrhal conjunctivitis. I. part.

Systematic Report on progress of ophthalmology, fourth quarter of 1897. A and B. (Translated.)

No. 2. Issued June, 1898.

6. BACH and NEUMANN. II. part.

7. ASCHHEIM, HUGO (Vienna). The transfixion of the iris.

8. SCHÖN, W. Polemics.

9. SILEX (Berlin). Ophthalmic electro-therapeutics.

10. GUILLERY (Cologne). On central acuteness of vision.

11. GLOOR, ARTH. (Basle). Partial incomplete coloboma of the iris.

Systematic Report on progress, fourth quarter, 1897. C. Translated in this number, p. 560.

No. 3. Issued August, 1898.

12. WEHRLE, EUGEN (Berne). Glaucoma after neuro-retinitis albuminurica.

13. KNIESS, M. (Freiburg). The chromoscope, an instrument to examine the color-perception of the yellow spot and surroundings.

14. ————. On congenital violet-blindness.

15. ————. On disturbance of color-perception by santonin.

16. HALLAUER, OTTO (Basle). Case of orbital phlegmon after dental operation.

17. GREEFF, R. Translations and abstracts of the original articles of the English edition (these ARCHIVES), Vol. XXVI., Nos. 1, 2, and 3, 1897.

No. 4. Issued September, 1898.

18. ISCHREYT, G. (Riga, Russia). Circulation and softness in atrophic eyes.

19. HAAS, Jos. (Vienna). Combined occurrence of changes in retina and choroid.

20. RITTER, C. (Bremervörde). Case of dislocation of the lens.

21. BONNE, GEO. Injuriousness of dark green lamp-globes.

22. HOPPE, J. (Elberfeld). Pathogenesis of congenital colobomas of the lids.

23. GLOOR, ARTH. (Basle). Case of favus of the upper eyelid.

Systematic Report on the progress of ophthalmology in the first quarter of 1898 (by an increased staff). A, B, C, D, E. To appear in our November number.

edies, and instruments, and to discuss in a progressive, yet conservative spirit all questions of present importance.

The ARCHIVES contain exclusively original papers on all branches of Ophthalmic and Aural Surgery, and original reports on the progress of Ophthalmology and Otology throughout the world. The original papers occupy about three-fourths of the space, and their scope embraces all subjects of scientific and practical interest in the departments of Ophthalmology and Otology.

Special attention is paid to the preparation of the Reports on the Progress of Ophthalmology and Otology. These Reports are intended to furnish *complete, systematic, and early reviews* of the current Ophthalmological and Otological literature of the world, and the work of preparing them is divided among a specially selected number of collaborators.

Under the heading of "Miscellaneous Notes" there will be published all kinds of professional news that concerns the Oculist and Aurist, *e.g.*, appointments, honors, resignations and vacancies, new ophthalmic and aural hospitals, prize questions and essays, announcements of Society meetings, etc.

Each volume contains besides a specified table of contents, an index of subjects and authors, both of the original papers and the reports, and a general index of the preceding seven years is added to every seventh volume.

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Communications for the English edition of the ARCHIVES OF OPHTHALMOLOGY should be addressed to DR. H. KNAPP, 26 West 40th Street, New York, those for the ARCHIVES OF OTOLOGY either to DR. H. KNAPP, or to DR. U. PRITCHARD, 26 Wimpole Street, W., London, England.

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EDITORIAL NOTE.

In asking for continued support of the ARCHIVES from subscribers and contributors, the Editors offer no new program, but point to the record of the work that has been accomplished during the past twenty-eight years. At the first appearance of the ARCHIVES in 1869, they constituted the only periodical of their class in America, and had only a few predecessors in Europe. The international character of the ARCHIVES was a novel and distinctive feature.

The original program of the ARCHIVES to publish only original papers in semi-annual independent numbers has, in the course of years, been extended by the addition of reviews of the current ophthalmological and otological literature.

With the eighth volume, in 1879, the combined ARCHIVES, issued semi-annually, were divided into two separate journals, issued quarterly, and each of about the same size as the combined journal, and the reviews were converted into quarterly reports, systematic and comprehensive, though concise, on the progress of ophthalmology and otology.

Since that date, the ARCHIVES have developed into an extensive and conveniently arranged storehouse of knowledge for the instruction of the student and for reference by the practitioner and the investigator.

For more than ten years, the valuable material offered to the ARCHIVES has been so abundant that it has not been practicable to utilize for the English edition the full series of papers from the German, or the converse. Many articles had to be abridged, while of others abstracts only could be printed. Any one of our readers could, however, have secured, and can secure in future, from the American editor, or the German publisher, the loan of the original papers presenting the complete text.

It is the purpose of the editors to arrange, in the department of Reports, for the review of every publication which in their opinion contains material that can be called distinctive and important. It is, of course, impossible, within the limits of the ARCHIVES or of any similar journal, to give attention to every publication in their department of science. We may state further that it is not a part of our program to furnish a complete report on the *bibliography*, but only on the **progress** of ophthalmology and otology.

Though the systematic arrangement of the reviews is of importance for reference and comprehensive information, we shall publish, as early after the meetings as practicable, reports of the proceedings of societies, always bearing in mind that the ARCHIVES are not intended to be only a repertory of knowledge, but also a journal of news.

It is natural that the English edition of the ARCHIVES should give the advantage of time and space to Anglo-American contributors over the German, and *vice versa*. It is evident, however, that the association of the two editions lends strength to each, furnishing to the authors a wider circulation for their papers, and to the readers a larger and more diversified field of information.

ARCHIVES OF OPHTHALMOLOGY

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain only **original papers** on all branches of ophthalmic surgery, and **original reports** on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the **Report on the Progress of Ophthalmology.** The report is intended to furnish *a complete, systematic, and early* review of what, in the opinion of the editors, is valuable in the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement :

A.—C. HORSTMANN.

1. General ophthalmological literature. 2. General pathology and therapeutics. 3. Remedies and instruments.

B.—ST. BERNHEIMER.

4. Anatomy. 5. Physiology. 6. Anomalies of refraction and accommodation. 7. Muscles and nerves.

C.—P. SILEX.

8. Lids. 9. Tear-passages. 10. Orbit and accessory cavities. 11. Conjunctiva, cornea, sclera.

D.—O. BRECHT.

12. Iris. 13. Choroid. 14. Sympathetic ophthalmia. 15. Glaucoma. 16. Lens. 17. Vitreous.

E.—R. GREEFF.

18. Retina. 19. Optic nerve. 20. Injuries. 21. Affections of the eye in general diseases.

In order to obtain complete and recent reviews on the ophthalmological literature of the world, **special reporters** have been selected for different countries, who will send quarterly abstracts of all local ophthalmological publications to **Dr. C. Horstmann,** of Berlin, the **editor of the Report.** Dr. Horstmann will distribute these abstracts among the **general reporters** according to the above plan, in order to preserve the systematic arrangement which we consider to be of paramount importance.

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In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology,—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or books for reviewing, to one of the above-named reporters, or to the editors or publishers of the "Archives," according to their convenience.

Archives of Ophthalmology.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. **Whenever a German paper is condensed in the English version, or** *vice versa*, **it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.**

Under the heading of **Miscellaneous Notes,** there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the "Archives," and are solicited.

EDITORS:

H. KNAPP, M.D.,
26 West 40th Street, New York.

C. SCHWEIGGER, M.D.,
Roonstr. 6, Berlin.

NOTICE TO CONTRIBUTORS.

The editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

1. As original communications the ARCHIVES can accept only such papers as have never been printed nor are intended to be printed in other journals. If a preliminary communication on the subject of a paper has been published, the author is requested to state this in the letter accompanying his manuscript. It is understood that contributors to these ARCHIVES and editors of other periodicals will make no abstracts of original papers published in this journal without giving it due credit for the same.

2. Authors will receive gratuitously twenty-five reprints of their articles. If a greater number is desired,—notice of which should be given at the head of the manuscript,—only the additional cost of presswork and paper will be charged to the author.

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d. Words to be printed in *italics* should be underscored once, in SMALL CAPITALS twice, in LARGE CAPITALS three times, **condensed** and **heavier** antique should be so marked.

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4. Authors receive proofs for revision, which they should correct and return without delay. We beg, however, to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them to make, if possible, no alterations at all in their MSS., or, at least, to limit them to what is of essential importance.

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ARCHIVES OF OPHTHALMOLOGY.

THE PATHOLOGY OF EXPERIMENTAL QUININE AMBLYOPIA.[1]

By Dr. WARD A. HOLDEN, New York.

(*With eight figures on Text-Plates VII.–X.*)

THIS investigation is one of a series projected by Dr. van Gieson and the writer, with the purpose of studying the pathology of the cerebral stratum of the retina and the optic nerve, as revealed by the modern technical methods now used in the study of diseases of the nervous system. The work was done in the Pathological Institute of the New York State Hospitals, and comprised the microscopic examination of the eyes and parts of the brain and cord of nine dogs, to which toxic doses of quinine had been given, and which died or were killed at periods of from two hours to seven weeks after the first injection.

Quinine amblyopia has been produced experimentally in animals by Brunner,[2] de Bono,[3] de Schweinitz,[4] and others. Brunner discussed the various possible ways in which quinine amblyopia might be brought about, and decided that it was due to the constriction of the retinal vessels. De Bono gave an excellent description of the clinical course of experimental quinine amblyopia, but curiously the examination of the eyes and optic nerves of his animals failed to reveal to him any pathological changes. On the other hand, he found that the injection of quinine in frogs prevented the usual migration of the pigment in the pigment epithelium

[1] Read in abstract before the American Ophthalmological Society, July, 1898.
[2] Brunner: "Ueber Chininamaurosis," *Inaug. Dissert.*, Zurich, 1882.
[3] De Bono: *Archivio di Ottalmologia*, 1894, pp. 171–227.
[4] De Schweinitz: *Toxic Amblyopias*, Philadelphia, Lea Brothers, 1896; containing a full bibliography and extracts of the more important papers on quinine amblyopia.

in response to light, and he concluded that quinine amblyopia was due to a disturbance in the percipient layers of the retina. His dogs never became totally and permanently blind. De Schweinitz in some cases obtained complete blindness from quinine injections, and found, months later, a total atrophy of the optic nerves, with structural changes in the vessels. Barabaschew,[1] experimenting on men, found that transient amblyopia with contraction of the visual field followed the administration of doses of quinine that were just sufficient to cause constriction of the retinal vessels.

It is the purpose of this investigation to follow the sequence of the pathological changes that lead up to the terminal optic-nerve atrophy.

EXPERIMENTS.—Quinine injected subcutaneously in dogs was found uniformly to cause abscess, whatever the salt or solution used. The pus gravitated downward, and caused great flaps of hide to be separated and cast off, necessitating the early killing of the animal. Therefore, after a number of dogs had been sacrificed in this way, the injections were made low down in the belly, and when fluctuation was found a day or two after, an incision was made, which allowed the escape of a sanguinolent liquid, followed later by a little pus, after which the wound healed speedily and the dog suffered little. Quiniæ bimur. carbam., which is obtained in one-grain soluble hypodermic tablets, was found to be a convenient form of the drug. The toxic dose, if it is rubbed in well after injection so that it is fully absorbed, is, on an average, rather more than one-half grain to the pound of body weight. Smaller doses usually did not cause blindness, and much larger ones frequently caused convulsions and death. The desired result seemed to be best obtained by giving first a moderate dose, and, if the toxic symptoms did not appear in the course of an hour, giving a second injection of a small quantity.

Symptoms.—Shortly after a toxic injection has been given, the pupils dilate, the corneas become anæsthetic, and the dog vomits. If on its feet it walks with a staggering gait; if lying down it sprawls out its legs and rests its muzzle on

[1] Barabaschew, *Arch. f. Augenheilk.*, xxiii., p. 91.

the floor. In from thirty to forty-five minutes it becomes totally blind and deaf. If the blinded dog is examined with the ophthalmoscope at this time, there is found a marked pallor of the optic discs, and the vessels of the retina appear constricted almost to obliteration. A single dose rarely causes permanent blindness, however, and, as a rule, the retinal veins regain their normal size after a day or two, the arteries may become slightly fuller, and with this a fair amount of vision returns and is preserved until the dose is repeated. With the recovery of vision, hearing is regained, the staggering disappears, the dog eats well and seems healthy. If the dose is repeated every second or third day, or if a smaller dose is given daily, all the symptoms of acute poisoning may be maintained, and the dog will rapidly become emaciated.

In these experiments the number of injections given to a single animal varied from one to six. The dogs were killed with chloroform, or by bleeding in slight chloroform narcosis, and the autopsy was made at once, so that post-mortem changes could be excluded. Three of the dogs examined died directly from the poison. In one of these the autopsy was made four hours after death, but in the two others the autopsy was delayed longer, and the latter cases, therefore, will not be described here.

Technique.—One eye of each poisoned dog and one eye of a freshly killed normal dog were hardened in 5 % formol for 3 days and then put into alcohols of increasing strength. Several portions of each retina and the nerve head were then imbedded separately in paraffin, cut in sections from 3 to 6 μ thick, and stained with Nissl's methylene-blue and eosin. The other eyes were hardened in formol, alcohol, or Müller's fluid, and imbedded in celloidin. The optic nerves were hardened in Müller's fluid for 3 weeks, and some portions were stained, as were also the Müller's-fluid retinas, by Weigert's hematoxylin method; other portions of the nerve and eyeball were changed from Müller's fluid to 1 % osmic-acid solution for 6 days for the Marchi stain. All Müller's-fluid specimens were cut in celloidin. One hemisphere of the brain and portions of the spinal cord were hardened in

95% alcohol to be imbedded in paraffin and stained by Nissl's method for cell changes; and the other hemisphere of the brain and other portions of the cord were hardened in Müller's fluid to be stained by Marchi's method for nerve-fibre changes.

PATHOLOGICAL CHANGES.—Figure 1 is drawn from a healthy dog's retina stained with Nissl's methylene-blue and eosin. The ganglion cells shown here (G G) are of medium size, but others are larger (Fig. 2, G), while many are much smaller and in sections consist only of a very narrow ring of protoplasm about the nucleus. The nucleolus stains dark, the nucleus is clear with faint markings, and the cell body consists of an unstained groundwork through which are scattered coarse darkly stained granules of various forms—the chromophilic bodies of Nissl. This is the normal condition unaffected by intra-vitam or post-mortem changes.

CASE 1.—One dog died two hours after the first injection and the autopsy was made four hours later, in warm weather. In the retinas no departure from the normal was noticed in Nissl preparations except a darker and more diffuse staining of the ganglion cells and of the nuclei of the outer nuclear layer, which, it is possible, was due to post-mortem processes and will not be dwelt upon.

CASES 2 and 3.—A dog that was killed with chloroform on the third day after a single very toxic dose, some degree of vision having returned, presented conditions very similar to those found in a dog killed by bleeding on the fourth day after four injections, with blindness still persisting. The layers of the retina affected in these two cases were the nerve-fibre and ganglion-cell layers, the other layers remaining absolutely normal. A certain number of the ganglion cells were of normal appearance in Nissl preparations, but others were in various stages of degeneration.

A few ganglion cells exhibited fine vacuolation (Fig. 3, A), and the nucleus had migrated to the periphery of the cell; in many others the Nissl granules had disappeared in part, revealing the naked cell reticulum (Fig. 3, B); while in a number the cell body had broken down until scarcely more than the nucleus remained (Fig. 3, C and D).

In Weigert's hematoxylin preparations, most of the ganglion cells appeared filled with black granules, and these granules were also found in the axis-cylinders close to the cells, and also free among the fibres (Fig. 5), indicating a chemical change in the ganglion cells and in their axis-cylinders, the nature of which we are not yet fully prepared to explain. The ganglion cells, however, did not take the osmic-acid stain, which affects only fats, and the degeneration was, therefore, not ordinary fatty degeneration.

The axis-cylinders, in preparations stained in various ways, revealed no marked varicosities or enlargements, but in many places they were spaced apart and even separated from the limitans interna. The limitans interna, where detached from the nerve-fibre layer, retained the cone-shaped bases of Müller's fibres, the fibres being ruptured a short distance from the base (see Fig. 4). Many of the cavities in the nerve-fibre layer, and between it and the limitans interna, were empty, having probably in life contained a non-coagulable liquid; but here and there throughout the nerve-fibre layer were seen globular bodies, some as large as a medium-sized ganglion cell, and others smaller. These bodies were mostly finely granular (Fig. 2, M M), although some were homogeneous (Fig. 6, M). They took the eosin stain well, and when so stained they resembled the myelin globules found in the lens in incipient cataract, or the myelin globules into which the outer segments of œdematous rods and cones break down after death. They did not, however, consist of fat or of myelin, since they stained neither with osmic acid nor with Weigert's hematoxylin, nor did they give the colloid reaction with van Gieson's picro-acid-fuchsin stain. They seemed to be globules formed through the precipitation of an albuminous liquid in the nerve-fibre layer, by the hardening fluids.

In sections of the retina stained by Marchi's osmic-acid method, many small cells in the nerve-fibre layer exhibited numbers of black granules near the margin of the cell. When counterstained with carmine, these cells appeared to be leucocytes (Fig. 6). Some of them were found about every blood-vessel (Fig. 6, V), and they gave one the impression of

being phagocytes which had taken up particles of fatty detritus, and were carrying them off in the lymph spaces about the blood-vessels. No structural changes were found in the vessels themselves.

CASE 4.—In a dog killed on the ninth day, the degeneration of ganglion cells was further advanced and more cells were affected. The Marchi osmic-acid staining method, which is the first to reveal degenerative changes in the optic nerve, gave at this time negative results.

CASE 5.—In a dog killed on the seventeenth day, small groups of fairly normal ganglion cells were found, while many cells were vacuolated and their chromophilic granules were so far wanting that the bare cell reticulum was clearly visible. Other cells were broken down until only the nucleus remained, while the total number of cells was small, indicating the complete destruction and disappearance of a number. The albuminous globules were still present in the nerve-fibre layer, and were found in greatest number at some distance from the disc. The optic nerves stained by Marchi's method now exhibited a few black dots scattered uniformly through the nerve, indicating the beginning of a breaking down of the medullary sheaths of the nerve fibres into fatty globules (see Fig. 7).

CASE 6.—On the forty-second day, in the retina of a dog to which but two toxic injections had been given, fairly good vision remaining, the nerve-fibre layer was extensively disorganized, and the limitans interna was detached here and there (Fig. 4); the albuminous globules, however, were scarcely to be found. Only a few ganglion cells remained, and most of these were partially broken down, or at least vacuolated. The optic nerve here exhibited an advanced degeneration of the medullary sheaths of the fibres (Fig. 7), without apparent increase in neuroglia or connective tissue, and this degeneration could be followed up the optic nerves and tracts (Fig. 8, T) to the ending of the fibres in the external geniculate body (Fig. 8, B), and pulvinar of the thalamus.

The ganglion cells of the external geniculate body, which do not send processes to the retina, were, in Nissl preparations, normal in number and in appearance. There were no

signs of nerve-fibre or ganglion-cell degeneration in the internal geniculate body to which fibres of the auditory nerve run, nor in the anterior quadrigeminal bodies from whose cells processes run to the retina, making up the centrifugal fibres of the optic nerve, nor in the spinal cord.

CASE 7.—Finally, on the forty-sixth day, in the only dog which apparently became totally and permanently blind from a single injection, the destruction of ganglion cells was found to be still further advanced, although even here small groups of ganglion cells appeared normal.[1] The degeneration of the medullary sheaths of the optic-nerve fibres was further advanced, but the ganglion cells of the external geniculate body still remained unchanged.

Résumé.—Although the arteries were constricted, no histological changes were noticed in the vessels of the nerve or retina in any case, there being neither thickening of the vessel-walls nor proliferation of the endothelium. The thin-walled central vein of the optic nerve was often found to be empty and collapsed, and the delicate connective tissue about it, with its small vessels, owing to its being stretched and apparently increased in amount, sometimes suggested the appearance of an organized thrombus in the vein, but this same appearance was noted also in healthy dogs when the vein was empty.

The pathological process, then, consists in a constriction of the retinal vessels, and particularly of the arteries, followed by a highly albuminous serous exudation into the nerve-fibre layer,[2] and a degeneration of the ganglion cells, together with their axis-cylinder processes which become the centripetal fibres of the optic nerve. There is no way of determining exactly how far the degeneration of the ganglion cells and their axis-cylinders may be due to the *direct* toxic action upon them of the cinchonized blood, and how far the degeneration may be due to the *indirect* toxic action of quinine in constricting the retinal vessels, and thus reducing their nutritive supply.

[1] In cases of extreme quinine amblyopia in man, small islets of vision have been found in the periphery of the field.

[2] Œdema of the retina has frequently been observed with the ophthalmoscope in quinine amblyopia in man.

Clinically it is found that amblyopia does not occur unless the injection of quinine produces marked constriction of the retinal arteries. The pathological changes are analogous to the degenerative changes which follow so-called retinitis of the inner layers. The retinal vessels nourish the six inner layers of the retina, the other layers being supplied by the choroidal vessels. Disorders of the retinal vessels cause degeneration of the inner layers, followed by an ascending atrophy of the optic nerve. This degeneration is seen most clearly after the complete stoppage of retinal circulation by embolism of the central artery, and after long-continued circulatory disturbances in cases of chronic glaucoma. The nerve fibres, ganglion cells, and the cells of the inner nuclear layer then all disappear, while the outer nuclear layer, the rods and cones, and the pigment epithelium, making up the outer layers of the retina, remain intact. With reduced, but not abolished, nutritive supply in quinine poisoning, the more delicate elements of the inner layers, that is, those most responsive to nutritive disturbances, namely, the nerve fibres and ganglion cells, break down and disappear; while the less delicate elements, the cells of the inner nuclear layer, are not perceptibly altered. From analogy it would seem justifiable to assume that the changes in the retina in quinine amblyopia are due chiefly to deficiency of nutritive supply, and, to a lesser degree, to alteration in the quality of the nutritive supply.

These changes, however, cannot be regarded as being specific for, or solely characteristic of, quinine poisoning. No doubt many functional and organic disturbances of the circulatory system and many morbid conditions of the blood may give rise to similar pathological changes in the retina.

The ultimate purpose of pathological investigation is, of course, to devise means of correcting pathological changes, and it seemed to me that the present study could not be considered finished without some therapeutic experiments.

TREATMENT.—The obvious therapeutic indication in quinine amblyopia is to bring about relaxation of the constricted vessels. For this purpose de Bono tried inhalations of nitrite of amyl some weeks after the toxic injection, but

he obtained no improvement in vision. From the preceding examinations it was evident that irreparable damage is done to the retina in the first day or two after the injection, and that therapeutic efforts to be of value must be undertaken early. Furthermore, other nitrites are known to be more lasting in their effects than the nitrite of amyl. The following is a record of one experiment in treatment:

July 27th, 1 P.M.—A healthy dog, with normal eyes, and weighing forty pounds, was injected with thirty grains of quiniæ bimur. carbam.

3 P.M.—The retinal arteries are small, the veins of normal size. The dog staggers in walking, but sees and hears. Six grains of quiniæ bimur. carbam. were then injected.

3:25 P.M.—The dog lies listless on the floor in a collapsed condition, does not respond to the voice, breathes heavily, and is evidently at the point of death. An inhalation of nitrite of amyl was given, which revived the animal so that it was soon able to walk, but it then appeared completely blind and deaf.

3:45 P.M.—Six *cc* of a one-per-cent. solution of nitrite of sodium was injected hypodermically. This injection was repeated three hours later, and was continued thereafter three times daily.

July 30th.—Vision is now fairly good and hearing is reasonably acute. The dog was killed with chloroform. Examination of the retinas revealed typical changes, as well marked as those that were found in a dog killed after the same period when no nitrites had been administered.

It is thus evident that in cases of profound quinine poisoning, nitrite of sodium in moderate doses, notwithstanding its apparent clinical indication, does not perceptibly prevent the usual morbid changes; and further therapeutic experimentation is desirable.

Explanation of the Figures on Text-Plates VII.–X.

FIG. 1.—Normal dog's retina. G G, medium-sized ganglion cells. Paraffin, Nissl-eosin stain. Leitz $\frac{1}{12}$ imm. Oc. 2. Reduced $\frac{1}{4}$.

FIG. 2.—Inner layers of retina three days after toxic injections of quinine. Paraffin, Nissl-eosin stain. G, a large ganglion cell, fairly normal. M M, myelin-like granular globules. Leitz $\frac{1}{12}$ imm. Oc. 2. Reduced $\frac{1}{4}$.

FIG. 3.—Degenerated ganglion cells from the retina shown in Fig. 2. A, fine vacuolation ; B, chromatolysis ; C and D, breaking down of cell body. Paraffin, Nissl stain. Leitz $\frac{1}{12}$ imm. Oc. 2. Reduced $\frac{1}{4}$.

FIG. 4.—Retina in sixth week of quinine poisoning. Absence of ganglion cells. Disorganization of nerve-fibre layer. A, normal artery some distance from the disc. Paraffin, Nissl-eosin. Leitz $\frac{1}{12}$ imm. Oc. 2. Reduced $\frac{1}{4}$.

FIG. 5.—Œdematous nerve-fibre and ganglion-cell layers near disc. Third day. Celloidin, Weigert's hematoxylin stain. A, a ganglion cell and its axis-cylinder filled with black granules. B, a ganglion cell in a more advanced stage of degeneration. Leitz $\frac{1}{12}$ imm. Oc. 2. Reduced $\frac{1}{4}$.

FIG. 6.—Nerve-fibre layer. Third day. Müller-osmic acid. Celloidin. Counterstaining with carmine. V, vein surrounded with leucocytes containing minute fat globules. M, homogeneous albuminous globules. Leitz $\frac{1}{12}$ imm. Oc. 2. Reduced $\frac{1}{4}$.

FIG. 7.—A portion of atrophic optic nerve with the medullary sheaths largely broken down into fatty globules (sixth week). Longitudinal section. Celloidin. Marchi osmic-acid stain. Zeiss Obj. A. Oc. 4. Reduced $\frac{1}{4}$.

FIG. 8.—Corpus genic. ext. and pulvinar, with atrophic optic tract (T) running over the surface and entering their substance at B. Celloidin, Marchi stain. X 6.

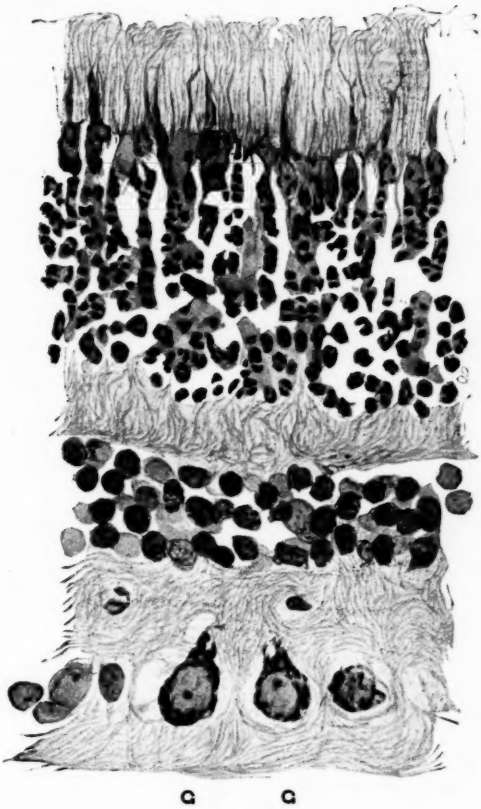
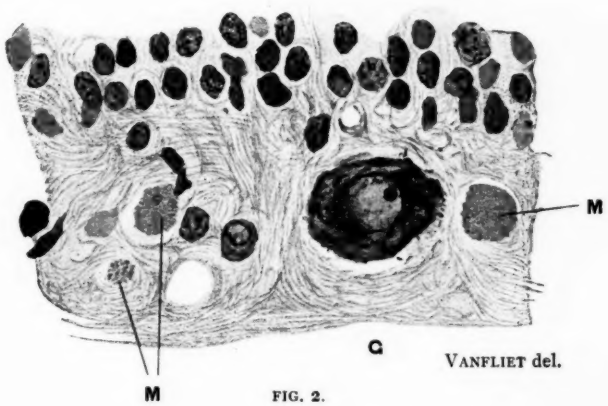


FIG. 1.



VANFLIET del.

FIG. 2.

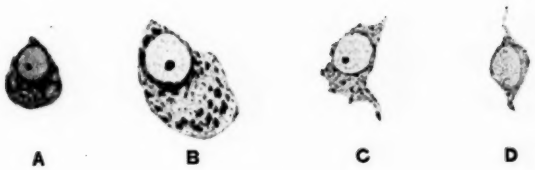


FIG. 3.

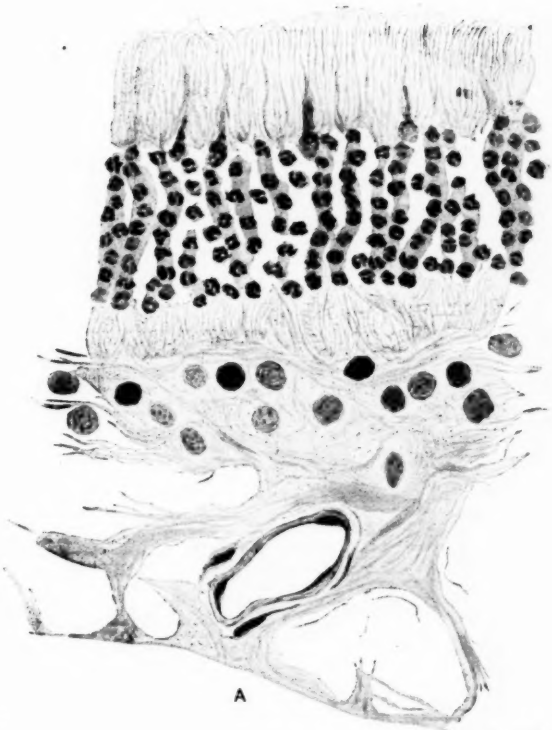


FIG. 4. VANFLIET del.

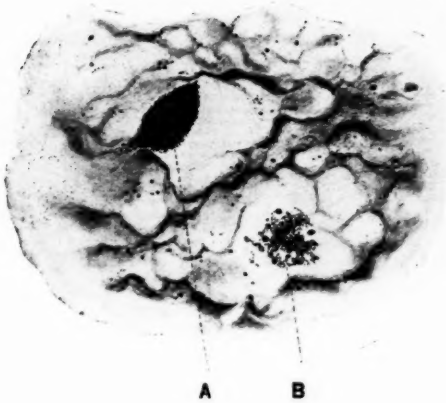
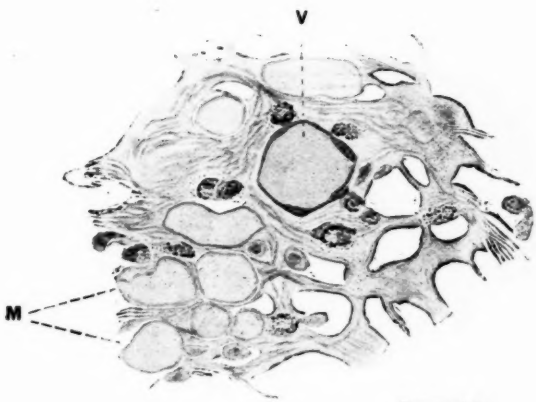


FIG. 5.



Bosse del.

FIG. 6.

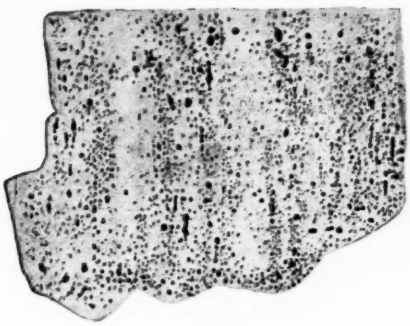


FIG. 7.

FIG. 8.

CONGENITAL IRIDEREMIA.

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WITHIN the past four years I have had the fortune to be consulted by two patients who presented congenital anomalies of the iris, which are rare in their occurrence and obscure as to their origin. The first was a case of total irideremia of each eye; the other a case of partial irideremia of one with coloboma of the iris in the other, a condition so rare that I have been able to find but one other case on record [141] [1] which claimed to present irideremia and coloboma in the same subject.

Case 1.—A little girl, five years old, was brought to my office, March 7, 1895, on account of the strange appearance of her eyes. Her parents assured me that she had never had any inflammation of, or injury to, her eyes and that her vision had always seemed to be good.

Both globes were well formed, the left slightly the smaller; the scleræ and corneæ were normal in appearance, size, curvature, and clearness; the lenses were clear and in their normal position; the aqueous and vitreous humors were clear and the fundus normal, but no trace of iris could be seen in either eye, nor any appearance of the ciliary bodies, though I looked for them carefully. The ophthalmometer showed the presence of 1.25 D of corneal astigmatism with the rule, in the right eye; .75 D with the rule, in the left. The vision of each eye was $\frac{20}{10}$ + and with the ophthalmoscope there appeared to be some simple myopic astigmatism of each eye. There was no nystagmus and the absence of photopho-

[1] The numbers in brackets refer to the bibliography at the end of the article.

bia was very noticeable. Even prolonged examination with the ophthalmoscope did not seem to cause as much annoyance as is frequently met with in the examination of cases with normal irides. The child presented no other abnormality, and no family history of iridic or other deformity of any kind could be elicited.

A year later this patient was brought to Dr. Davis, who prescribed glasses and furnished me this note of her refraction:

R V $\frac{20}{100}$; $\frac{20}{60}$ w — 4.50 ⌒ — 1 ax 5.

L V $\frac{20}{200}$; $\frac{20}{70}$ w — 5. ⌒ — 1 ax 175.

It is pretty certain that there was an increase in the myopia during the time which intervened between the two examinations, for the best vision obtained with the above correction was almost exactly the same as the unaided vision a year previously, and no allowance is to be made for surroundings, because at that time Dr. Davis and I occupied the same office. Through the courtesy of Dr. Davis I was enabled to re-examine the case Oct. 10, 1898. Unquestionably there is now considerable myopia and the lenses are undergoing changes. They exhibit irregular faint striæ of opacity, are slightly shrunken, as is evidenced by the irregularity of their outlines, and are slightly luxated directly upward.

Case 2.—A young woman, twenty-seven years of age, factory operative, entered the night clinic of the Manhattan Eye and Ear Hospital, March 24, 1896, on account of photophobia and pain in the right eye.

The eyeballs were well shaped and presented no abnormality in either cornea, sclera, lens, or fundus. In the right eye, the upper half of the iris appeared to be completely wanting, while the lower half was present only as a narrow band not over 2 or 3 *mm* broad. The pupillary margin of this band appeared regular and segmented, much as described by Posey [106]. In the left eye the iris presented a coloboma directed upward and inward which involved about an eighth or a sixth of its extent. There was no nystagmus, no other deformity, and the family history was, so far as I could ascertain, negative.

The corneal astigmatism, as determined by the ophthalmometer, was 2.50 D with the rule, in each eye. The examination was not completed at that time.

In August, 1898, the ophthalmometer showed R 3 D w. r. ax 105 or 15; L 2.50 D w. r. ax 75 or 165.

R V $\frac{20}{100}$; $\frac{20}{40}$ + w + 3 ax 105. L V $\frac{20}{40}$ —; $\frac{20}{30}$ — w + 2 ax 75.

The photophobia, though still a cause of complaint, was so

slight as hardly to be apparent to the observer. Otherwise no change had occurred. The ciliary processes were not seen.

Irideremia may be defined as absence of the entire iris or of a portion too great to justify the application of the name coloboma to the hiatus. The differentiation between partial irideremia and coloboma of the iris is not easy, because a definitive line has never been drawn between them, or if drawn, it has not been adhered to. In the *Encyclopædic Medical Dictionary*, coloboma of the iris is defined as "a fissure of the iris of varying size and shape, due to arrest of development." The same lexicographer defines partial irideremia as an "interruption in the iridal ring, half or even less of the iris being present." In the final clause of this definition a line of demarcation is suggested, that one half or less of the iris is present in partial irideremia. Another line of demarcation is suggested by Berry [1] in the statement that colobomata may be "of all sizes up to one fourth of the whole iris." These two guides are the best I have found, but they leave plenty of debatable ground, for a congenital defect of between one fourth and one half of the normal iris could hardly be called a coloboma if we adhere strictly to Berry's words, nor a partial irideremia if we similarly cling to the dictionary. The confusion in regard to this nomenclature is distinctly shown by the plates which accompany two original articles, one of a so-called coloboma, the other of a so-called partial irideremia. The first [141] represents one eye of the only case heretofore reported of irideremia in one eye with coloboma in the other. Rindfleisch's description was that the entire nasal third of the iris was wanting and that the balance formed a crescent. Compare that with the second case of Fiske's [161] which, though the defect appears to me to involve less than one fourth of each iris, is called by that writer partial aniridia. The case reported by Sous [60] also seems to me from its description to at least closely approach coloboma, but I have included each of these cases under the name assigned to it by the observer.

I have maintained the use of the term total irideremia to

[1] *Diseases of the Eye*, second edition, p. 270.

indicate cases in which no iris can be clinically detected, because the clinical distinction between total and partial irideremia is useful, although it may be that a rudiment of iris exists in every case. That such is the fact is not improbable, because such a rudiment has been found in each case of which I could find record, in which a congenitally irideremic eye has been enucleated and examined, but it should not be forgotten that Treitel,[1] after a microscopical examination of an eye which was supposed to have lost its iris through an accidental traumatism, which had extruded the lens, declared that the absence of the least trace of iris was so complete that he inclined to the belief that the irideremia was congenital.

The *literature on this subject* may be said to have wholly appeared during the present century. If the condition was previously noticed it was so very rarely that I have been able to find a reference to only one case, that of Klinkosch, who in 1766 reported the birth of a child of some teratological interest, and enumerated among its defects absence of the iris as well as of other parts of the eye. But the honor of being the *pioneer in the investigation* of this subject should be awarded to Baratta [?], who in 1818 published an account of the phenomena he had observed in the irideremic eyes of a young man who consulted him first in 1811. I have been unable to obtain Baratta's paper in the original Italian, but the copious extracts made by Jüngken [?], Gescheidt, and Lawrence[2] demonstrate his excellent powers of observation. In 1819, Alexander Morison, of London, reported another case in a French medical publication, an abstract of which was made in 1820 by Jüngken for Graefe and Walther's Journal [?]. In this abstract, as well as in a quotation made by Gescheidt, and in a reference by De La Rue,[3] the case is spoken of as one of total irideremia in each eye. I mention this because in his excellent article on this subject in Graefe and Saemisch's *Handbuch* Professor Manz mentions Morison's case as the only one known of monocu-

[1] *Arch. für Ophth.*, 1880, iii., 109.
[2] *Diseases of the Eye.*
[3] *Diseases of the Eye.*

lar irideremia. The error was simply one of reference. When Manz wrote that article, only one monocular case had been reported, but that should have been credited to Prael [[32]]. In 1834 the influence of heredity in the production of this defect was suggested by the publication by Gutbier [[17-26]] of a history of irideremia in several individuals of the same family, covering four consecutive generations. Quite a number of other cases have been described, usually with few or no comments, occasionally associated with theories and suggestions, some wise, some otherwise.

From this literature I have collated 158 cases, which, together with 4 cases for which I am indebted to Dr. H. S. Oppenheimer and the 2 cases of my own, make a total of 164 which I have tabulated. Of the 158 cases collated, 117 were obtained from original papers, 18 from translations or full abstracts, and 23 from brief abstracts or quotations, principally from the *Jahresbericht für Ophthalmologie*, but none from a simple reference or quotation which I was unable to verify.

Before I enter upon the results of my tabulation, I wish to express my regret that so many of the cases were not subjected to more thorough observation previous to publication. In so rare a condition, erroneous ideas can be detected and correct ones proven only by a consideration of the described conditions and symptoms in as large a number of cases as possible, and imperfect observation in any case detracts seriously from its value in such a compilation.

Sex may be eliminated as a controlling factor by the fact that of the 164 cases tabulated 76 were males, 70 females, and in 18 the sex was not stated.

No mention of the *family history* was made in 61 cases, it was pronounced negative in 31, while in the remaining 72 a positive family history was obtained. These 72 cases were found in 32 families, 29 of which showed the defect to have occurred in successive generations, while in 3, brothers or sisters only were known to be affected. The defect was found or reported to have existed in two generations in 20 families, in three generations 5 times, and in four twice. Felser's [[139]] patient stated that her father had eyes similar to

her own and, that her brother, whose eyes were normal, had a child with a similar defect. In the family under Fiske's [150] observation, the defect skipped one generation out of four. Accordingly, in spite of the difficulties frequently in the way of eliciting an accurate family history, we find that almost 44 per cent. of the cases tabulated occurred in families which furnished two or more examples, usually in different generations.

The *eyeballs* are stated to have been normal in form and size in 27 cases, large in 8, small in 9, misshapen in 5. These figures include the cases of hydrophthalmos and of microphthalmos as well as those which are noted simply as larger or smaller than normal. It may be fair to suppose that in the great majority of the 110 cases in which no mention is made of the globes they were normal in size and shape, because a defect in this respect would be apt to attract the attention of an observer who had noticed a fault in the iris, but, even if we assume that all were normal except the 22 mentioned, the percentage of abnormality is 14, a proportion sufficiently large to attract attention as possibly indicative of more than a simple coincidence.

The condition of the *sclera* is mentioned in only 15 cases, as normal in 7, as bluish or thinned, at least in its anterior portion, in 8.

More attention was paid to the *cornea*. In 61 cases, 37 per cent., some abnormality is mentioned, and in 19 they were said to have been normal. The size was said to be large in 1, small in 13, unequally prominent in the two eyes in 1. The curvature was noted as the same as that of the sclera in 2 cases, as too flat in 4, too flat in one eye in 1, and too convex in 2.

In 23 cases an abnormality was remarked at the *corneo-scleral junction*, which was variously described and probably differed somewhat in each case. A description applicable to all is a marginal cloudiness of the cornea with or without a plexus of minute vessels. The variations are evident from these descriptive terms: "opaque and bluish translucent," "circumcorneal injection," "diffuse turbidity," "toothed opacities," "linear grayish streaks," "gerontoxon," and

"arcus senilis," both the latter in young subjects. Macleish [140] described a peripheral zone of a fringe of minute superficial blood-vessels on the left cornea of his patient and added that this was "not a fœtal ring." I incline to think that all these marginal troubles are variations of the condition denominated by v. Ammon *fœtal ring*, because he considered it a persistence of a condition normally present in the fourth month of fœtal life. Six of the cases in which the corneæ showed this marginal condition also had opacities of other parts of the cornea, and 23 others presented one or more opacities which varied in degree from nebulæ to complete opacity of the cornea, and were situated in the different cases superficially, interstitially, and on the posterior surface. In 3 of these cases and possibly in a few others the cloudiness was due to the presence of glaucoma. In 3 cases the opaque cornea was covered by a vascular plexus. Some of the leucomata were clearly of ulcerative origin, some I should judge from the description could with difficulty be differentiated from interstitial keratitis, but though in other cases it was at least questionable whether inflammation had ever been present, even in intrauterine life, I could find no means to determine what proportion was due to faulty development, the existence of which was strongly suggested by the large proportion of corneal troubles in eyes which presented this defect.

The *anterior chamber* was noted as normal in 8 cases, deep in 7, shallow in 6, and not able to be determined in 1.

The *iris* appeared to be wholly absent in both eyes in 115 cases, partially absent in both eyes in 34, partially absent in the only eye mentioned in 1; wholly absent in one eye, partially in the other, in 6; present in one, wholly absent in the other, in 2; present in one, partially absent in the other, in 3; partially absent in one, polycoria in the other, in 1; partially absent in one, coloboma in the other, in 2. The latter includes the second case which I here report, an indubitable example of a condition hitherto described only by Rindfleisch [141], the representation of whose case I have already shown.

The great frequency with which *lenticular disturbance* is associated with irideremia has frequently been remarked.

I find the condition of the lens mentioned in 107 out of 164 cases tabulated, and in only 10 of these were both lenses normal. In 1 case there was aphakia, in 3 one lens alone was spoken of, 84 had changes in either the lens, its capsule, or both, in each eye, and 9 had similar changes in the lens of one eye only. There was ant. polar cataract in 9 cases, post. polar cataract in one or both in 15, and opacity of the anterior capsule in one or both eyes in 15. In 85 cases there was more or less opacity of the lens substance. These cataracts are usually soft, and I am not aware of the occurrence of a hard one in a single case. Clear and opaque lens matter was usually found irregularly arranged and the proportionate amount of each was so variable that, while in a few cases the cataracts might be designated lamellar or nuclear, in the majority a classification was impossible. Fuchs[1] speaks of cataracts of this sort as not infrequently present in eyes which present other congenital malformations, and considers them under the head of partial stationary cataracts. I incline to think they have a good claim to be classed under progressive cataracts, because in 8 cases we have a positive history of increase in the lenticular opacity, in 11 a history of decrease in vision which does not easily admit of explanation except through the development of cataract, and in only 3 cases were they definitely stated to be congenital. Hirschberg watched a case from babyhood, when the lens was clear and in place, until it was cataractous, shrunken, and luxated at the age of ten. My first case seems to promise a similar course.

The *position of the lens* was noticed in 37 cases. In 10 it was normal in both eyes, in 4 normal in 1 eye. The remainder, 50 lenses in all, were dislocated. Of these, 33 were luxated upward, 3 upward and outward, 1 upward and inward, 2 upward and backward, 4 were simply stated to be subluxated, 2 were dislocated downward, 1 was placed so that the lower edge tilted forward, and 4 were completely separated from their peripheral attachments. The tendency to upward luxation is very noticeable, as well as the absence of any cases of dislocation directly inward or outward.

[1] *Text-book of Ophthalmology*, trans. by Duane, p. 369.

The *ciliary processes and bodies* have attracted some attention on the part of certain writers because of the possibility of observing their action during accommodation, but this has seldom been accomplished. They are mentioned 44 times, 32 times as not seen, 12 times as visible. Inasmuch as in many of the 32 cases in which the search failed there was sufficient corneal opacity to render the search nugatory, it does not follow that in all these cases they were absent or even smaller than normal, but as in some cases they were demonstrated to be imperfectly developed, we know that occasionally the congenital defect in development involves the ciliary processes and ciliary bodies.

The great number of corneal and lenticular opacities seriously limited the number of cases in which an examination of the vitreous and of the fundus was possible, and the apparent proportion of cases which present changes in the posterior part of the globe is probably much smaller than the true ratio.

Fluidity of and opacities in the vitreous were noted 15 times. Once it was detected only after the removal of a cataractous lens.

The *optic nerve* was said to be normal in 20 cases, abnormal in 29; the retina normal in 22, abnormal in 14; the choroid normal in 21, abnormal in 12. In many of these cases the abnormality was due to pathological lesions, but after these were excluded several remained in which the conditions seemed due to mal-development.

Nystagmus was present in 69 cases, absent in 15, not mentioned in 80. It is usually lateral, sometimes rotatory, sometimes changing during accommodation, in a few cases atypical.

Irideremic eyes do not, as a rule, possess normal sensibility to light. When the pupil of a normal eye is dilated *ad maximum* by a mydriatic, or when the iris has been removed by traumatism, there is considerable photophobia, but of the 164 cases of congenital irideremia tabulated, only 6 are said to have had severe photophobia, in 29 it is mentioned as some or slight, and in 26 its absence is particularly mentioned. In 1 case photophobia did not exist at first, but de-

veloped later, and Sichel [68] reported a case in which vision was better in a bright light. An attempt was made by one writer to explain the absence of photophobia by the claim that Nature attempts to supply a diaphragm in the place of the iris to prevent excessive entrance of light into the eye, do away with spherical aberration, and increase clearness of vision by the formation of peripheral opacities in the lens. This theory was ingenious, but will not stand the test of investigation. In 4 of the 26 cases in which photophobia was absent, nothing was said about the lenses, in 2 they were normal, in 8 they had central opacities at the anterior or posterior pole or at the nucleus, leaving the periphery clear, in 10 there were generally scattered opacities of greater or less extent throughout the lens, and in 1 the opacity was limited to the peripheral portion of the lens. The latter case happened in the service of the gentleman who propounded the theory. The influence of lenticular opacities upon photophobia can hardly be great, because the lenses were cataractous in 4 of the 6 cases in which the photophobia was intense, and were not mentioned in the others. I am inclined to consider the absence of photophobia an abnormal lack of sensibility on the part of the retinal elements and to ascribe it to a faulty degree of development, an explanation which may also be applicable to the amblyopia usually found in irideremic eyes which present no opacities of their refractive media.

With regard to the *visual power* in irideremia, the data furnished are highly unsatisfactory. Such statements as "no interference with the vision," or "good at distance and near," are of no scientific value, yet they form in many cases all the material at my disposal. The first record of a test of vision in a case of this nature seems to have been by Dr. Schapringer [70] in 1874, but apparently he did not attempt to improve it with glasses. The number in which the vision without and with correcting glasses was recorded is very small, and I have been obliged to adopt the lax classification used by most writers on this subject, of good, fair, and bad. I have reduced the few properly recorded cases to this classification by considering a vision of $\frac{20}{200}$ or less as

bad, from $\frac{20}{70}$ to $\frac{20}{200}$ as fair, and $\frac{20}{60}$ or better as good. Accordingly, I find 22 cases in which the visual power was good, 16 in which it was fair, and 47 in which it was bad; 4 in which the vision was originally imperfect and had failed, 17 in which it was originally good and had failed, and 1 in which it was good in one eye but bad in the other. In the great majority of these cases, opacities of the media, disease of the nerve or of the entire eye, or congenital imperfections, furnished sufficient explanations of the defective vision, and in only 14 other cases was the vision said to be bad or fair. Of these, 4 were infants, 3 were cases of microphthalmos, and 7 were, perhaps, true cases of amblyopia. But among those said to have good vision, amblyopia can be shown to be very common. Franke [129], in 1889, obtained $\frac{20}{20}$ vision in a case of partial irideremia with 1 D of myopia. To the best of my knowledge, that is the only case in which a scientific test has been recorded and perfect vision attained; all others showed some degree of amblyopia. It may be an interesting subject for investigation to determine whether this amblyopia and lack of photophobia depend upon the obtundity of the sensitiveness of the retinal elements, by the great amount of light with which they have been habitually bathed, but in this connection it should be noticed that Franke's case had no photophobia. It is noticeable that very few patients with irideremia have retained good vision through a reasonably long life. Most of the cases in which the vision was said to be good were young, and in several the failure in vision was watched by competent observers. Evidently these eyes are more susceptible to morbid change than normal eyes; cataracts of anomalous form are apt to develop early, and a number of operators have testified that a greater degree of cyclitis or other destructive inflammation attends their removal than is usually the case. This fact, together with the greater liability to inflammatory attacks on slight provocation, tends to make the prognosis, as regards permanent vision, not as good as could be wished.

In only 66 cases was the *refractive condition* noted. It was given as emmetropia in 3 cases, hypermetropia in 19,

and myopia in 43. When we compare this proportion of myopia with that of myopia to the general population, estimated by Tscherning[1] to be 8 per cent., it is difficult to avoid the conclusion that the association of these two conditions is not wholly accidental. In one case the refraction was originally hypermetropic and later became myopic. This was similar to my first case, in which there was, at the time I examined her, simple myopic astigmatism, and a year later compound myopic astigmatism.

The statement has been made that *accommodation* is usually slight and frequently wanting. It appears to have been tested in only 21 cases, found good in 11, poor in 6, absent in 4. This observation does not support the above statement, but it is insufficient to form a basis for deduction.

The presence of *glaucoma* in 12 cases indicates a considerable liability on the part of irideremic eyes to this disease.

The greatest number of *associated abnormalities* of the eye seems to have occurred in the first case reported, that of Klinkosch. "Beside the lens and the vitreous there was only a portion of the ciliary body; all the remaining parts of the eye, choroid, iris, and retina, as well as the nerves and muscles of the eyeball and the lachrymal apparatus, were wanting." This observation is very imperfect, but the description furnishes an excellent puzzle for the embryologist. Parts formed from both the epiblastic and mesoblastic tissues are present, and other parts formed from the same embryonal tissues are absent, while a portion of the uveal tract is stated to be present, which is supposed to develop later than another part said to be absent.

Malformations of other parts of the body were present in 8 cases. Klinkosch's case is spoken of as a monster; Cooper [[149-51]] reported 3 cases of microphthalmos with faulty development of the teeth; Carpenter [[193]] and Stephenson [[155]] had each one case of talipes varus; one of Fiske's cases [[152]] had a supernumerary thumb, and Bailey [[194]] described one with congenital atresia ani, umbilical hernia, and faulty development of the teeth, but these are not sufficient

[1] Noyes, *Diseases of the Eye*, 2d ed., p. 93.

to show any etiological association between irideremia and malformations of other parts of the body.

The absence of *consanguinity* in the parents is mentioned several times, but I find no record of a case in which the parents were said to be nearly related.

A number of theories have been advanced for the purpose of explaining this anomaly. Perhaps the first was suggested by Behr [140], that the *iris became involved in the destruction and removal of the pupillary membrane.* Ammon's criticism of this [140] was that, if it were true, partial rather than total irideremia should be the rule, and since then it has been proven incorrect by Van Duyse's case [117], in which a persistent pupillary membrane co-existed with a rudimentary iris, and by Collins's case [143], in which traces of the pupillary membrane were present. Ammon considered that as the development of the iris follows that of the rest of the uveal tract, irideremia would result from an arrest of development at about the fourth month of intrauterine life, but I do not understand that he attempted any further explanation.

Prael [32] suggested the curious theory that the *formative energy of the other parts of the eye was so great that during development the iris was outrun and failed to attain its proper degree.* Himly [1] took the opposite ground—that the defect resulted from *insufficient formative energy* at this period of embryonal life. More than forty years later, the same or a similar idea was advanced by Debendetti [118], who ascribed it to lack of formative energy, so that the border of the primitive optic vesicle grows forward too slowly and consequently is too weak to form the iris in the presence of the absorptive process which has begun in the anterior part of the globe.

For many years it was not certain that the iris was ever really absent. According to Rindfleisch [140], the Société du Cercle Médical de Paris appointed a commission to investigate this subject after the publication of Morison's case, and the commission reported that such a condition should be considered *congenital mydriasis.* Years later we find Sichel

[1] *Krankheiten u. Missbildungen d. menschl. Augen.*, ii., 177.

[[88]] of the same opinion, and he attempted to explain its occurrence as the result of a cerebro-ocular affection of congestive nature, the traces of which had mainly disappeared. In support of this idea he cited that which has been relied on as the prop of several other theories, the frequent co-existence of capsular cataract.

As early as 1832, Arnold called attention to the fact that, if all the anterior and long *ciliary vessels were absent*, no iris could develop, and if single ones were wanting, a partial absence of the iris would result. Later Seiler[1] attributed irideremia to the *obliteration of the nutrient vessels* which supply the iris during development. In 1897, Posey [[166]] propounded the theory that defective development of the iris is due to the *absence of one or more iridal capillaries from the major circle of the iris*, about which the different segments of the iris are built up. Possibly the iris does develop thus in segments, as was also suggested by Fichte [[168]], but its failure to appear is hardly explained in this manner, because it is quite as probable that the absence of the vessels, and of the tissue of the iris, may depend on a common cause, and, even if not, the reason for the failure of the vessels to develop would be the true cause of the irideremia.

Manz[2] assigned as the cause, a mechanical obstruction to the development of the iris occasioned by an *abnormally persistent adhesion between the lens and the anterior wall of the globe*. Connective-tissue bands have been adduced as a sufficient cause for coloboma by Hess, while Plange declares that a persistent pupillary membrane, due to abnormally developed vessels, or to a union of the vessels of the sac with the capsule of the lens, offers an obstruction to the protrusion of the iris between the lens and the cornea, and thus produces coloboma. These obstructions are not supposed to be of inflammatory origin, but rather developmental faults, and if competent to produce coloboma, may be acknowledged sufficient for irideremia. But I find it difficult to reconcile this theory with the well-known power of growing tissues to overcome serious obstacles. As an example

[1] *Ann. d' Ocul.*, vii., 179.
[2] *Graefe u. Saemisch's Handbuch*, ii., 90.

of the penetration of a more serious obstacle than we have any right to assume could be found in adhesions between the cornea and the lens, I will quote the case related by Ogle,[1] in which one of the roots of the left hypoglossal nerve was found to pass directly through the left vertebral artery. Unless we assume the presence of a greater obstacle than this, the theory seems to me to be at fault.

Again, in two cases, those of Van Duyse [117] and Collins [118], it was evident that a pupillary membrane had been formed, even though the iris in each case was very rudimentary. The pupillary membrane I understand to be formed from a thin layer of mesoblastic tissue which has penetrated between the cornea and the lens, and as the margin of the secondary optic vesicle with its cloak of mesoblast bends inward to form the iris, the mesoblast follows the course of this thin layer, makes it thicker, and separates from it only in the region of the minor arterial circle. If this be correct, it is evident that whatever obstacles existed in these cases, in the form of adhesions between the cornea and lens, were overcome by the layer of mesoblast to form the pupillary membrane prior to the commencement of the iris, and the non-development of the latter cannot be referred to the presence of such adhesions.

In 1877, Brunhuber [81] reported a case of hydrophthalmos of both eyes with irideremia of one, which he attributed to *atrophy from pressure upon the completely or partly formed iris.* In 1888, Tockus[2] adduced increased intraocular pressure as the means whereby the iris is pressed against the cornea and impeded in its growth, and in 1898 Dunn [108] ascribed a very peculiar form of partial irideremia to atrophy from pressure due to the increased tension in glaucoma. But Brunhuber could not give a satisfactory explanation why this effect was found in only one eye of his patient, and Dunn was unable to explain how a segment of iris in each eye escaped the pressure which destroyed the rest. Aside from the fact that the advocates of this theory found it difficult to account for all the conditions present in their

[1] *Journal of Anatomy and Physiology*, Oct., 1894.
[2] Abst. in *Jahresber. f. Ophth.*, 1888, pp. 148–219.

own cases, a serious objection to it is that in the majority of cases of irideremia there appears to have been no evidence of the present or past existence of great intraocular pressure. Of the 164 cases tabulated, glaucoma was noted in 13 cases, and increased size of the globe in 5. On the other hand, in 10 cases there was either microphthalmos, small globe, or minus tension. In Klein's case [79], the eyes were somewhat prominent, the tension diminished, and the papilla pale and excavated as in glaucoma. In Wurst's case [78] of microphthalmos with minus tension, there was a deep excavation of the optic nerve, and in both of Van Duyse's cases [109, 117] there was a deep physiological cup. In Hartridge's [127] there was a deep cup with possibly increased tension in one eye. Most observers failed to mention the size and tension of the globes, but they were pronounced normal in 15 cases, of normal size in 7, of normal tension in 5, and no other cases are reported to have shown evidence of the existence at any time of increased tension. In a number of cases where glaucoma was present, there was good reason to believe that it appeared several years after birth, although the irideremia was congenital.

Rindfleisch [140] in 1891 advocated the theory that an *inflammation* occurred *at an early period of intrauterine life in the tissues about the corneal limbus*, and that this prevented the development of the iris. This view was reiterated by Brose [144] two years later. Posey [156] remarks that this theory cannot hold good where the ring of opacity in the cornea or other evidences of fœtal inflammation are wanting, and Hess strongly opposes it, saying that of five cases of malformation of the iris examined by him, taken from man, pig, and chicken, he did not find one which favored this theory, while some disproved it. I cannot agree with Rindfleisch that a thin, bluish sclera, as described by Gutbier, Henschel, and others, is an evidence of intrauterine inflammation, because it may with equal confidence be ascribed to faulty development. The same is true of the fœtal ring and the lack of choroidal pigment, while the occurrence of fluid vitreous, detachment of the retina, or staphyloma of the cornea, the result of recurrent ophthalmia, all of which are cited by this

writer, was found in every case years after birth, and does not furnish any evidence of intrauterine inflammation.

These theories may be divided into two classes: first, those which refer the failure on the part of the iris to develop to *some condition of the environment*, which may include the theory of involvement of the iris in the destruction of the pupillary membrane, those which refer it to the absence of iridal vessels, and those which attribute it to mechanical obstruction, inflammation, or intraocular pressure; and second, those which refer it to a *fault of the potential energy* which determines the development and growth of embryonic tissues. All of these theories have been based upon the study of only a few cases, so I have tried to amass a sufficient number to form a satisfactory basis for a reasonable consideration of the probable etiology of this defect.

The first fact which is impressed on us by a study of these tabulated cases is the *great preponderance of the number in which the iris was, clinically speaking, totally absent in both eyes.* The second, the still greater preponderance of the number in which the defect was *symmetrical* in both eyes. In quite a number of cases of partial irideremia, the description was insufficient to enable the reader to determine whether the defect was or was not exactly alike in the two eyes, but sufficient to show that they were not dissimilar, and in only 7 cases was the defect evidently unsymmetrical. This number, added to the 13 in which the conditions of the two irides were not the same, gives only 20 cases out of 164 in which the irides were affected differently or to a markedly different degree. In other words, in nearly 90 per cent. of all the cases I have been able to tabulate, the defect in the two eyes was symmetrical, and the cause or causes which produced it operated equally or nearly so upon both eyes of each individual affected. It is not reasonable to assume that in 90 per cent. of all cases both eyes would be seized with the same inflammatory process in the same region with the production of exactly similar results, that abnormal adhesions would exist thus symmetrically in the fœtal tissues of each eye, or that other conditions of the environment should be so equally bad in each eye as to induce a symmetrical disfigurement.

The influence of *heredity as a predisposing factor in the etiology of irideremia* has been strongly advocated on account of its occurrence in several succeeding generations in a few families. That a positive history of iris defects in members of the same family, most of which were verified, was obtained in 72 out of 164 cases, and that the very large majority of these showed its occurrence in successive generations, furnishes good evidence of the correctness of this view. But if this is the case it tends strongly to exclude what may be termed environmental causes and rather to indicate a *hereditary tendency on the part of the formative powers in the fœtus not to develop the iris.*

It is seldom possible to obtain an irideremic eye for microscopical examination, but a few opportunities have been afforded. The descriptions are elaborate, and I have found it difficult to select the salient points and to describe them as briefly as necessary. Pagenstecher [[140]], Lembeck [[138]], Debendetti [[113]], and Rindfleisch [[140]] all describe the rudimentary iris as caught between two lamellæ of Descemet's membrane. Lembeck says: "The rudimentary iris was enclosed between two layers of Descemet's membrane, and had formed an abnormal union with the cornea and sclera. One of the layers of Descemet's membrane passed beneath the iris, to which it had grown fast, and was lost in the ligamentum pectinatum, while the other passed down over the posterior surface to cover the imperfectly developed ciliary bodies. The uveal part of the iris lay stretched out on the cornea to a greater distance than the retinal part, in which one could easily recognize two layers." Collins [[149]] states that the uveal pigment on the back of the rudimentary iris ended in a double fold, and that there were abnormal adhesions between the ligamentum pectinatum and the root of the iris. Remnants of the pupillary membrane were present. Debendetti and Rindfleisch each describe the cornea as of varying thickness in different places, as well as faultily differentiated from the sclera. Lembeck's was a case of keratoconus. Debendetti and Rindfleisch found the ciliary processes directed backward, and, like Lembeck, poorly developed ciliary muscles. De-

bendetti found the choroidal and the pigment epithelium atrophic, but Lembeck found them normal, except in circumscribed areas of choroidal atrophy with accumulations of pigment epithelium about their borders.

A point of importance, I think, is the *uneven thickness of the cornea*, because in its early development the cornea is thicker at the periphery than in its centre, and attains a uniform thickness at a later period. This, as well as the great susceptibility of the cornea in these cases to inflammation, the occurrence of non-inflammatory opacities, and occasional poor differentiation from the sclera, seems to me to be evidence that the development of the cornea was arrested at a certain point, possibly by the same cause which arrested the development of the iris.

The occurrence of irregular opacities in the lens in over 50 per cent. of all cases, the frequent appearance of central anterior capsular opacity, and the luxation of the lens in 22 per cent. seems to indicate that this tissue may also be frequently affected by the cause of the irideremia.

So much uncertainty exists with regard to other parts of the eye that all that can be said is that the rest of the uveal tract and optic nerve were sometimes found not properly developed, and that the frequent nystagmus, amblyopia, and absence of photophobia may be perhaps considered evidence of faulty development of the retina in other cases. From all of which I infer that the cause of the irideremia is apt to involve not only the iris but also to affect the development of the various tissues in the anterior part of the globe, if not of the entire eye.

As I understand the course of events in embryonal life, at a certain period, after the inclusion of a portion of the epiblast to form the lens, a portion of the mesoblast passes over the margin of the secondary optic vesicle to fill the space left by the separation of the lens and the external epiblast and form the cornea. A portion of this is differentiated to form the anterior layer of the iris, while the margin of the secondary optic vesicle itself, formed of epiblastic tissue, bends in toward the lens and spreads out to form the posterior layers of the iris. Faulty differentiation of the meso-

blastic tissue would result in no iris at all rather than in a rudimentary one, and as thus far all microscopical examinations, with the exception of Treitel's examination of a traumatic case, have revealed the presence of a rudimentary iris, we would not be justified in ascribing irideremia to a faulty differentiation of the embryonal tissue.

But after the development of the eye has proceeded as far as to the commencement of the iris, *lack of formative material* from which to complete the work, *lack of formative energy* to utilize the material at hand, or a *misdirection of this formative energy* to abandon a portion of the work, would each be competent to produce the deformity. I do not know that anomalies of the iris are more common than anomalies of some of the hidden tissues of the body. They are more frequently noticed because they are where they can be seen, while the others are usually discovered only on the dissecting table. Dwight,[1] Gruber,[2] and others have described supernumerary bones, absence of bones in whole or in part, supernumerary muscles, absence of muscles, supernumerary mammæ, etc. Lack of material or energy cannot explain all these deviations from the normal standard. The appearance of supernumerary organs can better be explained by a misdirection of the formative energy, and I cannot assert that this may not also cause absence of organs, among others of the iris. But in such a case irideremia would not be likely to be associated with the developmental faults of other parts of the eye that I have mentioned, while if due to lack of material or of energy, incomplete development of other tissues in the eye to a greater or less degree might be confidently expected. The formative energy, which is equal to the proper development of the rest of the embryo, seems hardly likely to fail thus, and symmetrically, in the eyes alone. As the embryo develops fairly symmetrically, an equal or nearly equal amount of developmental tissue would be assigned by the controlling power to each optic vesicle, and if this were insufficient for the perfect development of one eye it would probably be insufficient for the other also,

[1] *Jour. of Anat. and Physiol.*, October, 1887.
[2] *Arch. f. path. Anat. u. Phys. u. f. klin. Med.*, Bd. cx., Hft. 3.

and the defect in the two completed eyes would be nearly or quite the same, and involve not only the iris but other tissues also. This is the condition in the great majority of cases, as I have shown, and therefore *I am disposed to ascribe as the cause of congenital irideremia, a lack, usually hereditary, of sufficient formative material for the development of the eye.*

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NOTES ON OPHTHALMIC BACTERIOLOGY, PARTLY WITH REFERENCE TO ASEPSIS.[1]

By H. GIFFORD, M.D., Omaha, Neb.

THE writer happened to be the first to report, in a paper published in the ARCHIVES OF OPHTHALMOLOGY in 1886,[2] that the normal conjunctival sac frequently contained pathogenic germs, and that the methods of sterilizing the sac, then in vogue, failed altogether to destroy or remove them. I say "happened" advisedly, because the matter was evidently in the air, and it was not long before several other observers, working independently, reported similar results in much more complete and thorough articles than my own. Since then, I have pursued the same subject with intermittent zeal in the hope that in spite of my first negative results, and the unanimous testimony to the same effect from other men, some method might be found of ridding the conjunctival sac of germs without doing too much violence to the tissues. But the only outcome has been to confirm me absolutely in the belief that, from the nature of the conditions, no such method can be found. This opinion is now so prevalent, that I should not take time to discuss it, were it not that I have evidence, which seems to me more convincing than any which has yet been offered, of the hopelessness of the case. I shall not weary you with details of the two hundred and odd experiments

[1] Read before the Ophthalmic Section of the New York Academy of Medicine, March 21, 1898.

[2] ARCHIVES OF OPHTHALMOLOGY, xvi., p. 180, 1886, and *Arch. f. Augenheilk.*, xvi., p. 197, 1886. I may perhaps be excused for referring to this, since the priority in the matter is almost invariably given to Gayet, whose paper appeared more than a year after my own.

which I have made in this direction, but shall merely cite a few, each typical of a class. After numerous fruitless efforts under ordinary conditions, I made the following experiment on a cavity from which the eye had been enucleated two days before, the absence of the eye allowing some of the usual difficulties to be eliminated. The cavity was first thoroughly irrigated with a freshly sterilized saturated solution of boracic acid; the edges of the lids, and the surrounding skin were well scrubbed with swabs which had been boiled in sublimate 1:2000; the whole conjunctival surface was carefully wiped with similar swabs, and the cavity freely irrigated with the same solution; then gauze, freshly boiled in boracic-acid solution, was packed over the tear points and the edges of the lids, so as to shut them off from the cavity, and a wet, freshly sterilized boracic acid dressing applied. After twenty-four hours, the bandage was removed, and an agar culture made from the sac, which resulted in a fairly abundant growth of the white pus coccus.

Convinced by a number of similar experiments, in which various antiseptics were used, that asepsis of the sac could not be maintained for any length of time, I was still inquisitive as to whether this was due to the primary difficulty of ridding the membrane of germs, or to reinfection from the lid-borders or the tear sac. It occurred to me that in wiping out the sac some of the germs might simply be chased around, so to speak, from one corner to another, and thus escape removal. But the experiments which I then made showed that it was not necessary to go so far for an explanation. From the results obtained by general surgeons, and more especially by the experiments of Welch and his pupils, we have become familiarized with the practical impossibility of sterilizing the skin. But it *did* seem as though a membrane so smooth as the conjunctiva, free from hair follicles and deep and penetrating sweat glands, might, if one could only get at it freely, be easily cleansed of germs simply by a thorough wiping; but the event proved otherwise. In eight cases, the patients having been anæsthetized for other purposes, I applied a Demarres clamp so as to include the greater part of the upper retrotarsal fold,

and then by eversion bring it into plain sight and keep it free from contact with any other part of the conjunctiva as long as might be necessary. This portion of the membrane was then wiped thoroughly with swabs boiled in boracic-acid solution, then with others boiled in water. Cultures were then made from it by the scraping method, to be described later on, with the result of finding germs (generally either white pus cocci or xerosis bacilli) still present in seven cases out of the eight. In another series of experiments, the membrane of the lower lip was treated in the same way, with the result of finding germs after the wiping in six cases out of seven. In one of the lid cases, in which sublimate swabs 1:500 were used, no growth was obtained, while in another, a case of trachoma, with very little roughness of the fold, and which had been treated with 2% silver every day for two weeks, the clamped portion of the conjunctiva was covered with the 2% silver solution for about half a minute, then washed off with sterilized boracic solution, and then rubbed with swabs boiled in water; but in spite of all this, a scraping from the surface gave a growth of the white pus coccus.

Whether the germs which these experiments show to be so difficult to remove, merely lie deep down in the epithelium or are within the tubes of the conjunctival glands it is perhaps impossible to determine and is of no material importance. The fact remains that, under conditions much more favorable than we can hope to obtain in routine practice, the sterilization of even limited areas of the conjunctiva is practically impossible. On this account I have not thought it worth while to spend much time on the more difficult problem of sterilizing the lachrymal sac or of cutting off the connection between it and the conjunctiva.

With regard to the

LID-BORDER,

the question of sterilization is still of some practical importance, because I find that the pus germs are even more prevalent here than in the conjunctival sac. The strip of skin between the roots of the lashes and the conjunc-

tiva I have found to be, apparently, tolerably easy to sterilize by mechanical means; and in the secretion of the perfectly normal Meibomian glands,[1] I have, as a rule, found no germs; but on coming to the roots of the lashes quite different conditions were found to prevail. Here, not only are the white or yellow pus germs present in nearly or probably every case, but it seems to be practically impossible to get rid of them. In one case, for instance, the roots of the lashes were first scrubbed with sterile-water swabs, then with 2% silver, then with sterile-salt solution, then with water again, with the result that from each of three lashes (two with the root and one without), a growth of the white pus coccus was obtained. In ten experiments of this kind, some with antiseptics, some with purely mechanical measures, sterilization of the roots of the lashes was not obtaind in any case. Preliminary scrubbing with an alkaline solution, followed by an application of tri-chloride of iodine oil, as recommended, particularly by Panas, gave no better results. As might have been expected, the growth of germs was most vigorous from the hair root and sometimes occurred exclusively from this part.

It is evident, I think, from what has been said that, leaving the tear sac out of consideration, we have in the lash roots and the conjunctiva itself two apparently ineradicable sources of germ life. Granting this, what are the practical conclusions to be drawn? Shall we give up all attempts at reducing the danger of infection from these sources, and confine our efforts at asepsis to our instruments and hands? This I think would be, as the Germans say, to throw out the child with the bath, for while none of the methods adopted has cleared out all the germs, none of them can fail to reduce materially their number, at least for the time of the operation and long enough thereafter for the wounds which we make to become more or less completely sealed. The important things to remember are, first, that we must always

[1] The perfectly normal Meibomian secretion is a clear, watery-looking fluid of which only a minute drop can be obtained from each gland by squeezing the lid firmly. This I have found to be sterile in seven cases out of eight. The tallowy-looking plugs which can be squeezed from many lids are pathological, and I have always found them to contain abundant germs.

count on some germs being present and hence make our operations as swiftly and with as little violence to the tissues as possible; and, secondly that in our efforts to temporarily reduce the number of germs about the field of operation we must proceed so gently as not to excite much reaction, since this is almost sure to be followed by a marked increase of germ growth. The routine which I have adopted as the proper means for a cataract extraction is as follows: The lashes are cut off short, their roots and the lid borders are vigorously wiped with sterilized boracic-acid swabs, or with a 2% silver solution if there have been any signs of blepharitis. Then, after cocainization, both conjunctival cul-de-sacs and the surface of the eyeball are wiped with moist fluffy swabs, I say both, although if the patient be one of the unmanageable kind I neglect the upper cul-de-sac rather than excite a reaction by attempting to get at it by force. In addition to this, the surface of the globe is always wiped at the point of operation immediately before introducing any instrument into it, and where a wound is to be re-entered, the surface is first irrigated with a lukewarm sterile solution. Wiping I consider decidedly more reliable for ridding an uncut surface of germs, but where a wound has already been made, wiping might press a germ into it which irrigation would carry away. There can, of course, be no objection to irrigating the surface of the globe, before, during, and after the operation. Whether an indifferent sterile fluid such as salt or boracic-acid solution, or some weak antiseptic be used I consider immaterial. My instruments are always boiled in a closed vessel for five minutes in a 1% soda solution immediately before the operation; and on use are taken directly from this. The practice of changing them from the sterilizer to a receptacle containing alcohol or some other supposed antiseptic seems to me unnecessary and objectionable. For each operation I have a small quantity of a 3% cocaine solution freshly sterilized in a short test tube which is hung down into the fluid in which the swabs are being sterilized, the boiling being continued for ten minutes.

With regard to the practice of bandaging the eye for twenty-four hours preceding the operation, I feel sure that it is a

mistake. I have made five experiments which show conclusively that it increases the number of germs in the sac, and any important trouble with the conjunctiva or tear sac which it might tend to bring to light can, I think, be discovered equally well by other less objectionable methods.

To return to

THE GERMS OF THE NORMAL CONJUNCTIVA,

the question as to whether the sac is ever naturally free from germs will, I think, be answered variously, according to the method of examination employed. The usual method to obtain material for cultivation is with the platinum-wire loop, or with a sterile swab. With these methods all observers, so far as I know, have found quite a large percentage of apparently sterile sacs. Eyre, for instance, in an excellent article recently published,[1] reports an average of 50 per cent. For a long time I made my inoculations with the wire loop, and chiefly upon some preparation of agar, and always obtained about 25 per cent. of negative results. For the last two months, however, I have been using serum in place of agar, and, in place of the wire loop, platinum wire nearly $\frac{1}{8}$ in. thick, hammered out at the end into something the shape of a small, blunt razor, with the blade 3 *mm* broad and 10 *mm* long. With this a larger or smaller portion of the conjunctival surface is scraped rather firmly, and the substance obtained spread out upon a long slant of coagulated serum. The results were quite surprising. Where I formerly, by taking three platinum loopfuls, obtained on an average not more than five or six colonies, I now rarely got less than twenty, and in cases where the patient was anæsthetized, so that the scraping could be carried out thoroughly, the average has been about two hundred. In a recent case, in which only the upper retrotarsal fold was scraped, between three and four hundred colonies were obtained. In these luxuriant cultures from the normal membrane, however, the vast majority of the colonies are, as a rule, of one or another kind of the

[1] *Annals of Ophthalmology*, October, 1897.

xerosis bacillus; the number of white coccus colonies not being increased by this method to anything like the same extent. Of the last fifty cases in which this plan has been applied to the normal conjunctiva, only three negative results were obtained (*i. e.*, positive results, 94 per cent.), and in these three only a small portion of the membrane was touched. I believe that if all parts of the sac could be properly examined, it would never be found sterile. The xerosis bacilli, which I believe are always present, I have found in at least three varieties, and as they generally fail entirely to grow when the inoculation is made directly upon agar, and as they appear to adhere particularly closely to the epithelium, it is not surprising that their abundant occurrence has been to some extent overlooked. Eyre, in the paper already quoted, states that he almost always finds the upper fornix sterile; while I can say that with the method described I have never found it sterile where I have had a fair chance at it, hundreds of germs not uncommonly being found there. Luckily, however, according to the investigations of Weeks and others, these bacilli appear to be entirely innocuous, though I have some reasons, which I hope to test in the near future, for thinking that this opinion needs qualifying. The white micrococcus, which I have referred to as the white pus coccus, is, I have no doubt, in many cases the same as that described by Randolph as Welch's staphylococcus epidermidis albus,[1] but I must say that I have not been able to convince myself that there is any well-defined distinction between this and the ordinary staphylococcus pyogenes albus. The forms which I have found in the normal conjunctiva have, in all cases in which they have been tried, liquefied gelatine, though sometimes very slowly, and their pathogenicity has equalled, on the average, that of white pus cocci from other sources. I have found them also, exclusively, in several cases of the severest kinds of infection, and believe that they must be reckoned with as a constant and dangerous factor in eye surgery. I will briefly detail one of these cases, as it is of great interest from an etiological and a therapeutic standpoint.

[1] *Transactions American Medical Association*, Ophthalmic Section, 1897.

The patient was a man of forty-five, with immature cataracts. The conjunctiva was normal, and the ordinary precautions were taken before making a preparatory discission. The instrument used was a very thin cataract knife hardly $\frac{1}{16}$ of an inch in width and was taken directly from the pan in which it had been boiled, passed into the anterior chamber through the upper and outer limbus, and the capsule of the lens slightly lacerated. Although I had, as usual, examined the point of the knife before giving it to the nurse to be wrapped in cotton preparatory to the boiling, at the operation it penetrated very badly, and after being entered for a short distance it was removed and started in again. After the operation, it was found that the point was slightly bent, probably having been poorly wrapped. On the second day after the operation, the eye showed decided signs of infection, which resisted all antiphlogistic measures, the lens gradually becoming yellow, the iris discolored, with diffuse congestion of the ball; and, on the fifth day, a drop of thick pus could be seen exuding from the wound in the capsule. To pursue a non-operative course seemed to be the equivalent of allowing the eye to go to destruction, and yet the prospect of removing the lens under these conditions was anything but pleasing, for it hardly seemed possible that the infected lens could be so thoroughly removed that some of the germs, which were almost certain to be left, would not develop with renewed vigor in the remnants of the lens. It was decided to operate, however, and, making an incision in the upper limbus, I first syringed out the anterior chamber with sterile boracic solution, then made an iridectomy and expelled the purulent lens matter, as thoroughly as possible, and then irrigated the anterior chamber very freely with boracic solution. To my surprise, the operation was followed by a prompt cessation of all inflammation; and an uninterrupted recovery with the attainment of vision nearly $\frac{20}{20}$ was made. An agar culture of the lens substance, which was taken with the greatest care, gave a profuse and apparently pure culture of the white pus coccus

I have no reason to think that in this case I neglected my ordinary precaution of wiping the surface of the eye at the point where the knife was entered, but it is possible that I may have forgotten this. At any rate, I think there can be no doubt that the germ which started the trouble was carried into the eye from the surface of the limbus by the defective

point of the knife, since in a vessel-less organ like the lens, a hematogenous infection could be excluded. This experience and the difficulty which other experiments have shown to exist in the way of cleaning the conjunctiva, even by wiping, have led me to consider the advisability of scraping the surface of the ball with a blunt instrument before entering a knife or needle; but I confess that I have not put this idea into practice as yet.

In one other case of soft cataract, in which, after a linear extraction, signs of infection appeared on the fourth or fifth day, and the anterior chamber became half filled with pus and puriform lens remnants, the apparently inevitable loss of the eye was averted by thoroughly syringing out the chamber, the improvement being immediate and vision of $\frac{20}{100}$ being ultimately attained. The contents of the anterior chamber in this case also gave an apparently pure culture of the white pus coccus. I believe with Randolph that this or some other white coccus is a constant inhabitant of the conjunctival sac, because while I have not been able to demonstrate it in more than 75 per cent. of the cultures from the conjunctiva, I have almost invariably found it upon the lashes.

The only other of the numerous occasional inhabitants of the sac which I shall consider is the

PNEUMOCOCCUS OF FRAENKEL.

I have seen no reason to change the opinion expressed two years ago, that in the vicinity of my home this germ is by far the most frequent cause of acute catarrhal conjunctivitis, and since I have been using serum or serum agar almost exclusively for my primary cultures from the eye, I have come to realize that it is of vastly more importance in all sorts of infections than I formerly believed. It cannot be insisted too strongly that serum cultures must be made if this germ is to be detected with anything like the frequency with which it really occurs. On agar it sometimes does not grow at all, or with such slight vitality that its presence is effectually concealed by the numerous colonies of other germs. Even on serum its colonies must be searched for with the utmost care, as they are very insignificant, almost trans-

parent, and are generally so interspersed with colonies of the xerosis bacillus that they are apt to be passed over. From a purely practical point of view the only conclusion worth mentioning which I can at present draw from its study is one suggested by the effects of chloride of zinc upon cases of pneumococcus conjunctivitis. In such cases the simple instillation of a $\frac{1}{8}$ of 1 per cent. solution of this salt generally causes the pneumococci to disappear from the sac with astonishing rapidity, and if the upper lid be everted so as to bring the remedy into contact with the upper retrotarsal fold as well as the lower, a few applications almost always cure the worst cases. When the germs have become thoroughly established in the cornea or in the tear sac, this influence is not so marked. But even if it hold only for the conjunctiva, if the pneumococcus is as frequent and dangerous an inhabitant of the sac as there seems to be reason for believing, it may well be worth while to make one or two applications of the zinc solution to the everted lids, even in nominal cases, before intraocular operations.

In summing up, it may be said that (1) these experiments not only confirm the common belief that ordinary methods fail to rid the conjunctival sac of germs, but show that some of the germs lie so deep under the epithelium or in the ducts of the glands that even small, freely exposed areas of the retrotarsal folds are not, as a rule, freed from them by vigorous wiping; this also applies to the mucous membrane of the lips. (2) So far, it has been found impossible to sterilize the roots of the lashes with any certainty. (3) The white pus coccus and the xerosis bacillus are probably always present in the normal sac; the former, at least, being often decidedly pathogenic; hence the necessity for operating rapidly and gently. (4) Although complete sterilization of the conjunctiva and lash roots is impossible, moderate wiping of both is decidedly advisable immediately before operations. (5) In estimating the number of germs in the conjunctival sac, no method should be depended on in which the membrane is not scraped rather firmly.

ABSTRACTS OF ARTICLES NOT PREVIOUSLY TRANSLATED IN VOL. XXXI. (1895) OF THE ARCHIV FÜR AUGENHEILKUNDE.

By Dr. WARD A. HOLDEN.

I.[1]—On Herpes Zoster of the Iris in the Course of Herpes Zoster Frontalis.

By Dr. **E. MACHEK**, Lemberg.

HUTCHINSON, who first described the corneal complications of herpes zoster, observed iritis also, as a complication, and later observers have confirmed this. In a case of my own, however, the complication on the part of the iris was not an ordinary iritis, but so resembled the herpetic eruption on the skin that I am inclined to believe that the cases of iritis which have been described as complicating herpes represented in fact an expression of herpes in the iris.

The patient, a man of fifty, suffered from a severe hemorrhagic herpes affecting the left half of the forehead, the temple, the upper lid, and the side of the nose. The conjunctiva was chemotic. Some days later ciliary injection appeared, the aqueous became cloudy, the anterior chamber appeared deep, and the iris took on a darker color and became adherent to the lens. In the following days several localized swellings appeared in the iris presenting fresh blood on their apices, then breaking down with the outflow of blood into the anterior chamber. The anterior chamber was filled with a blood clot, and, as this became absorbed,

[1] The numbers correspond to the numbers of the articles in the German edition.

fresh hemorrhages recurred over a period of two months. Finally, when the blood became absorbed, a dense pupillary and iridic membrane was discovered. Later the cornea became flattened and cloudy, and tension was diminished.

IV.—On Intermittent Exophthalmus.

By Dr. **P. U. RICHTER**, Munich.

Considering the attention given to those forms of exophthalmus known under the comprehensive term "pulsating exophthalmus," it seems not unwise to notice also one of the rarer forms of exophthalmus, viz., that which is probably due to simple varicose dilatation of orbital veins, and lacks pulsation, bruit, and signs of congestion in eyeball or orbit.

My patient, a healthy girl of fourteen, with normal vision and eyes of normal appearance, had noticed for a year that her right eye became prominent when she bent over. On examination, vision was found to be normal in each eye, and the face was of normal appearance. After bending forward for a minute, and then resuming an upright posture, the entire appearance of the face was changed. While the cheeks and forehead were moderately red, and the temporal veins showed blue through the skin, the eye was so far covered by the œdematous upper lid that the cornea could not be seen. On raising the upper lid, the ball appeared prominent and displaced downward and outward. In a quarter of a minute all this changed, and nothing abnormal could be noticed.

The exophthalmus was more marked when the body, as well as the head, was bent forward. It appeared also when the right jugular vein was compressed, and slightly when only the left jugular was compressed, and was greatest when compression was exercised on both veins. Compression of the carotid had no effect.

It was, therefore, natural to assume that the exophthalmus was due to varicose dilatation of the retrobulbar veins, and this explanation is the one generally given by those who have observed such cases. It is true that genuine cavernoma may exist in the orbit, but in such cases the exophthalmus is permanent, and pulsation and bruit are likely to be found. The two conditions seem to have ex-

isted together in some cases, there being an intermittent exophthalmus with a cavernoma of the orbit.

Abstracts of a number of cases from the literature follow.

V.—On so-called Double Sensations.

By Dr. **RICHARD HILBERT**, Lensburg.

By double sensations we understand conditions like *audition colorée*, in which excitation of one sensory nerve gives rise to sensation, not only in the sphere of this one sensory nerve, but also in the sphere of another sensory nerve. Whether these peculiar and always congenital conditions should be treated of in the category of cerebral pathology or in that of cerebral physiology is still undetermined, and there are many points in the matter that are puzzling.

The following varieties of double sensation have been described:

1. Color and form perception from sound sensation (sound-photismata).
2. Sound perception from light sensation (light-phonismata).
3. Color perception from smell sensation.
4. Color perception from taste sensation.
5. Color and form perceptions from pain, temperature, and touch sensations.
6. Color and light perceptions from sensation of form.

The common features of all double sensations are, first, the fact that they are the more intense the less the person heeds them; and, secondly, they arise in the person in a constant and unvarying way. Furthermore, these sensations are more intense in childhood than in later life, and inheritance is of importance.

I have recently had the opportunity of seeing a person with double sensations which differ from all those previously described.

A healthy and intelligent man, who since his earliest youth has made the following observation almost daily: If, when he was on the point of falling asleep, the clock on the wall happened to strike, he seemed to see a rose-colored flame, sharply outlined and of conical shape, which seemed to represent a distortion of

the clock, and lay, apparently a foot in length, obliquely in his field of vision. Careful questioning revealed no other variety of double sensation in this person.

The four hypotheses which have been advanced to explain these phenomena, and a long and complete bibliography of the subject, end the paper.

The four hypotheses are:

1. The transmission from the cerebral centre of one sensory organ to the centre of another by commissural fibres.

2. Two organs of sense have a common centre, as in certain animal species of low development—a kind of atavism, according to Darwin's theory.

3. Two adjacent fibre tracts receive and conduct the impression of one organ of sense to the centres of two organs. (Defective insulation.—STEINBRÜGGE.)

4. Nerve fibres of one sensory organ mingle with fibres of another. (Partial decussation.—THORP.)

VI.—On the Accurate Localization in the Eye of Large Splinters of Iron or Steel by Means of the Sideroscope.

By Dr. **EDUARD ASMUS**, Breslau.

Remarks on the use of this instrument, which had been previously described in *Graefe's Archiv*, vol. xl., p. 280, and in the *Archiv f. Augenheilkunde*, vol. xxix., p. 126, and lately in a handsome monograph, Wiesbaden, 1898, which will be reviewed.

VII.—A Further Case of Unilateral Reflex Iridoplegia.

By Dr. **SEGGEL**, Munich.

With unilateral reflex iridoplegia, one pupil reacts to light neither directly nor consensually, and is, when no complications exist, dilated. The other pupil reacts to light both directly and consensually.

In a case of left reflex iridoplegia reported previously, I ruled out a lesion of the sphincter nucleus, since accommodative reaction of the pupil was normal, and located the interruption of conduction in the centripetal portion of the

reflex arc, viz., in Meynert's fibres, which pass from the anterior corpora quadrigemina to the sphincter nucleus, and also in the association fibres connecting the two sphincter nuclei.

Recently Heddaeus has reported fresh cases, and rejecting my explanation, would locate the lesion in the centrifugal portion of the reflex arc. According to him, the individual nuclei of the third nerve are not in direct connection, and the sphincter nucleus cannot be excited directly from the accommodation nucleus. The iris branch of the third nerve, however, is made up of two roots—one from the sphincter nucleus, and one from the accommodation nucleus. Destruction of the sphincter nucleus, or of the root springing from it, causes, therefore, unilateral reflex iridoplegia with moderate mydriasis.

This explanation of Heddaeus is applicable to my first case, in which the pupil was dilated, but not to a second case, in which there was miosis.

A detailed report follows of the size and reaction of the pupil in the second case after the use of miotics and mydriatics, and the author, granting Haddaeus's contention that the case of reflex iridoplegia with mydriasis must be due to a lesion in the centrifugal portion of the reflex arc, believes that his case of reflex iridoplegia with miosis is due to a lesion in the centripetal portion of the arc.

XI.—On Binocular Vision.

By Dr. **E. JAESCHE**, Dorpat.

A physiological and metaphysical dissertation of 35 pages, which cannot be abstracted.

XIV.—Bacteriological Investigations on the Effect of Various Antiseptic Dressings on the Number of Micro-Organisms on the Lid Margin and in the Conjunctival Sac.

By Dr. **L. BACH**, Würzburg.

The antiseptic liquids used were 1:3000 bichloride of mercury solution and 1:5000 oxycyanide of mercury solution.

Lint soaked in one of these solutions was placed on the lids and covered with cotton, also wet with the solution, and then with gutta-percha, dry cotton, and a bandage. This dressing was reapplied three times in the twenty-four hours. Cultures were made of scrapings from the conjunctival sac and lid margin before the dressing was applied and at the expiration of twenty-four hours. About ten cases were studied. The author's conclusions are as follows:

1. An antiseptic dressing will not insure with any certainty the sterility of the lid margins or conjunctival sac. On the contrary, under such a dressing the number of micro-organisms present is usually increased.

2. The results were the same with different antiseptics.

3. The increase in micro-organisms under an antiseptic dressing was often a little less than it was under a simple moist or dry dressing.

XVI.—On a Simple Method of Destroying the Tear Sac.

By Dr. **DÜRR**, Hanover.

In chloroform narcosis the internal palpebral ligament is stretched, and a narrow knife entering 5 *mm* above is carried through the middle of the ligament and downward 2.5 *cm*. It then enters the canal, whose mucosa is divided until the knife passes into the lower nasal meatus. A bit of Vienna paste, the size of a grain of wheat, enveloped in lint, is pushed down into the nasal duct, and a small quantity of the paste is pushed also into the upper end of the sac. After remaining for one and a half minutes the paste is removed, the wound is packed with lint, and iced applications are used. Some chemosis follows, which is treated with warm applications. Healing takes place in about two weeks. It is important that the mucosa and submucosa of the upper end of the nasal duct be destroyed, and that the entrances of the canaliculi into the sac be destroyed. This method is shorter and easier to perform, and healing is quicker than after the operations for extirpation of the

sac. If some part of the mucosa has not been fully destroyed, and pus still forms, this part can be destroyed later by touching it with a probe on which silver has been fused.

XVII.—Experimental Studies on the Importance of the Pneumococcus in Ocular Pathology.

By Dr. **LUDWIG BACH**, Würzburg.

In this paper, Bach combats the views of Gasparrini, who first announced the fact, now universally accepted, that the chief micro-organism in the production of serpent ulcer is the Fränkel pneumococcus.

XVIII.—On the Space Relations of Light and Color Sense.

By Dr. **GUILLERY**, Cologne.

The author considers the difference in the results of tests of light and color sense dependent upon differences in the size and distance of the test objects. All the recent literature is discussed in detail.

XIX.—On Disturbances of Circulation and Changes of Tension in Eyes with Sarcoma of the Choroid.

By Dr. **KRÜDENER**, Riga.

The author examined microscopically nine eyes containing tumors, paying special attention to the emissary veins. The obstruction to the venous circulation is supposed to be the cause of the increased tension.

XX.—Three Cases of Unilateral Reflex Iridoplegia.

By Dr. **FRITZ SCHANZ**, Dresden.

(*With two figures.*)

It is still questionable how this condition is brought about. It is generally believed that the sphincter nucleus receives impulses from the centripetal pupillary fibres of both sides and from the accommodation nucleus of the same

side. Thus in Fig. 1, S_1 and S_2, representing the sphincter nuclei, would receive impulses from a_1 and a_2 the centripetal fibres, from b_1 and b_2 the centripetal fibres of the other side, and from c_1 and c_2 the fibres bundles passing out from the accommodation nucleus. The pupil P_2 reacts directly, consensually, and in accommodation, but the pupil P_1 reacts only in accommodation. Seggel explains the condition by supposing that the centripetal tract a_1 is destroyed, and that a second focus must lie in the commissure b_1, which con-

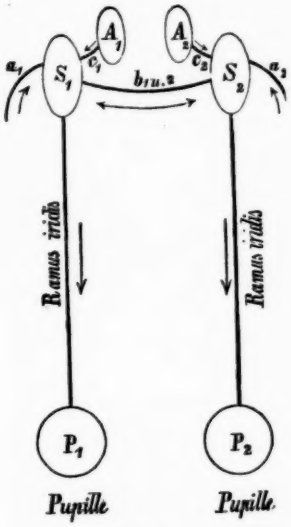


FIG. 1.

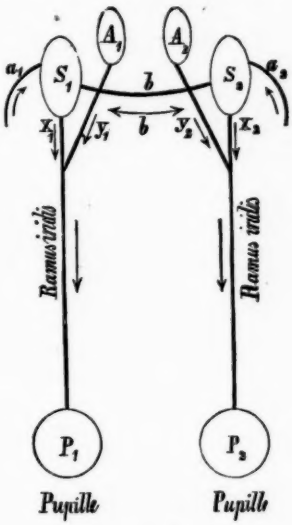


FIG. 2.

nects the two sphincter nuclei, affecting it in such a manner that the fibres from S_2 to S_1 are destroyed, while those running from S_1 to S_2 remain intact.

This is all highly improbable, and a more rational explanation is that of Heddaeus. He believes that the accommodation and sphincter nuclei stand in no direct relation, that the sphincter nucleus cannot receive impulses from the accommodation nucleus, but that the ramus iridis of the third nerve arises from two roots, one (x) from the sphincter nucleus and the other (y) from the accommodation nucleus,

Fig. 2. Destruction of the sphincter nucleus or its root (x) causes unilateral reflex iridoplegia, and if (y) is involved as well there is absolute immobility of the pupil.

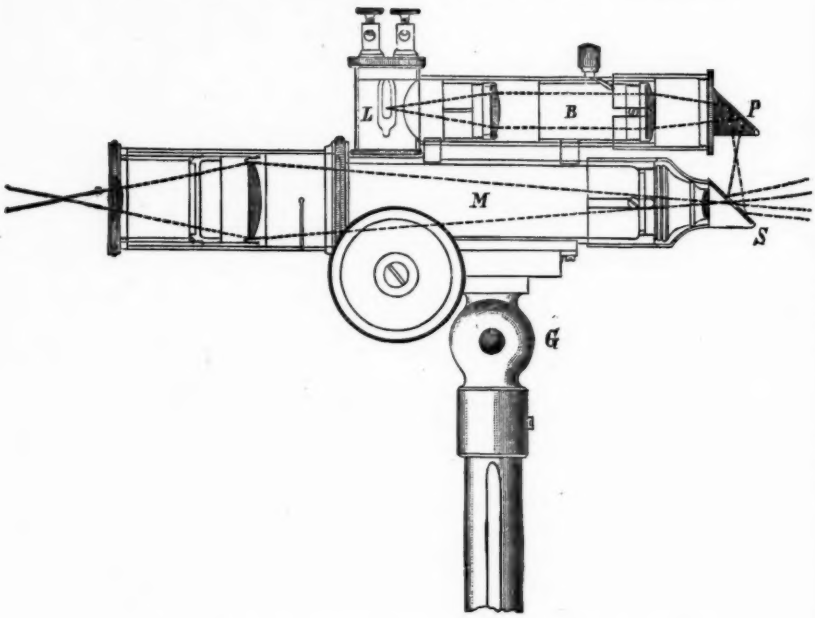
The author relates the clinical histories of three patients with unilateral reflex iridoplegia which can be explained by Heddaeus's scheme.

XXI.—A Corneal Microscope and a Retinal Telescope with Conaxial Illumination.

By Dr. **F. SCHANZ**, Dresden.

(*With one figure.*)

I. The construction of the microscope is as follows: On a stand with a movable joint (G) rests a microscope (M),



above which is an illumination tube (B), with an incandescent light at (L). The light passes through lenses and reaches (P) a total reflecting prism, from which it is reflected to the perforated mirror (S) and then into the eye to be ex-

amined. The rays of light returning from the eye pass through the perforation in the mirror (*S*) and through the microscope to the eye of the observer.

The advantages of this instrument over the double loupe of Zehender are the greater magnification secured and the axial instead of lateral illumination. It is especially serviceable in studying pupillary reaction. The light is turned on suddenly and the faintest response can be observed and measured.

II. In the second instrument, a telescope is substituted for the microscope, and, as in the direct method of ophthalmoscopic examination, an actual image of the fundus is obtained. By focussing with the ocular, which contains cross hairs, the location of this image can be found and thus the refraction determined. The writer together with Dr. Cyapski is now experimenting with an instrument which it is expected will determine extreme degrees of ametropia, and permit satisfactory photographs of the fundus to be made.

XXII.—A Case of Splintering of the Outer Margin of the Orbit and the Wedging-in and Adherence of a Splinter beneath the Roof of the Orbit.

By Dr. **G. BRANDENBURG**, Trier.

A man of forty-one was struck on the right side of the face with a beer bottle on April 21, 1895. He was stunned but was not rendered unconscious. The wound bled profusely and was sutured after the removal of several splinters of bone.

After the wound was healed the patient complained of dizziness, of a dull feeling in the right side of the head, and of palpitation of the heart, as well as of diplopia.

When first examined by me a hard body was felt below the outer portion of the roof of the orbit, corresponding in position to the scar following the injury, and pressing the eyeball downward and inward. An incision was made along the brow and the outer margin of the orbit, the periosteum of the orbit was dissected up, and a splinter of bone 12 *mm* long was found adherent at one end to the roof of the orbit. The splinter was detached with a chisel, the wound was

sutured, and after healing the ball regained its normal position and mobility.

XXV.—On the Mechanism of Sarcomatous Ectropium.

By Prof. **EMIL von WOLFRING**, Warsaw.

The author attempts to explain the way in which is brought about that form of ectropium which follows chronic blennorrhœa and other conjunctival affections, and is characterized by excessive swelling of the retrotarsal fold.

Microscopical examination of such lids showed him that the epithelium is much thickened, but that the chief cause of the swelling is an hypertrophy of the tarso-conjunctival glands, which lie in the retrotarsal fold. The glandular tissue further is infiltrated with leucocytes.

XXVI.—Is Mercury Absorbed in the Eye after Subconjunctival Injections of Sublimate?

By Dr. **O. STUELP**, Mülheim-on-the-Ruhr.

The writer, having made many experiments on animals, finds that after subconjunctival injections of bichloride of mercury, no chemical reaction for mercury can be got in the ocular tissues, nor can any granular deposits of calomel be detected with the microscope. Experiments with subconjunctival injections of coloring matters then showed that the injected substance became diffused through the subconjunctival tissues and extended back into the orbit, but it never penetrated the sclera or reached the interior of the eye. In those cases in which improvement really follows subconjunctival injections of bichloride of mercury, he believes, with Mellinger and others, that the injection acts as an irritant, hastening the lymph circulation and increasing metabolism, by which means the noxious substances are more quickly eliminated from the diseased organ.

XXVIII.—On the Frequency of Local Tuberculosis of the Eye, and the Relation of Tuberculosis of the Eye to Tuberculosis of Other Organs, with Remarks on Diagnosis and Prognosis.

By Dr. **RUDOLF DENIG,**

Assistant in the Würzburg University Eye Clinic.

The author has arranged in a number of tables data relating to tuberculosis of the eye, obtained chiefly from literature. He believes in local tuberculosis of the eye due to primary infection, as well as in local tuberculosis following tuberculosis elsewhere in the organism. In the former class the prognosis as to life is favorable, in the latter unfavorable.

Report of a Case of Hepatic Ophthalmia.

By Dr. **HORI,** Japan.

(From Prof. Fuchs's Clinic in Vienna.)

It has long been known that diseases of the liver may cause hemorrhages and tissue changes in the retina, opacity of the media of the eyes, and even corneal ulcers.

Hori's patient, a man of forty-nine, with cirrhosis of the liver, was emaciated and jaundiced. With the ophthalmoscope the retinal vessels appeared normal, but the choroidal vessels were yellowish-red, and the fundus had the appearance of retinitis pigmentosa lacking the pigment in the periphery. The visual field was contracted, and there was hemeralopia. Later corneal ulcers developed, and shortly afterwards the patient died.

The corneas exhibited large ulcers with colonies of streptococci at their margins. The anterior chambers were filled with masses of exudation. The irides and ciliary bodies were œdematous and infiltrated with round cells. Many of the ciliary processes were atrophic, and their vessels sclerosed. The choroids had undergone a connective-tissue degeneration, and the vascular layers were much diminished in thickness. The retinas were œdematous, and there was some infiltration of round cells in the nerve-fibre layer.

Evidently there was a chronic inflammation of the uveal tract, affecting the other tunics of the eyeball, and also a

streptococcus ulcer of the cornea. The uveal process began in the anterior portion of the tract, the sclerotical changes being most marked in the ciliary processes and the anterior portion of the choroid. The changes in the retina corresponded in degree to the choroidal changes, being most marked in the periphery. This doubtless explains the concentric contraction of the field.

It cannot be denied that there is a direct relation between ocular affections and liver diseases. Whether the ocular affection is due to the diminution of nutritive supply in icterus or to an abnormal condition of the blood cannot yet be decided.

XXX.—A Case of Unilateral Blindness and Diabetes Mellitus Following Severe Injury.

By Prof. **L. WEISS** and Dr. **M. GOERLITZ.**

The subject of diabetes following trauma has recently assumed a considerable importance in its relations to the matter of accident insurance, as well as in general interest. The following is a case in point:

P. E., æt. sixteen, a mason's apprentice, fell from a considerable height and was found unconscious and bleeding from the mouth and nose. In a week the patient recovered consciousness, to find that he could not see with the right eye. After six weeks the patient was able to leave his bed, but later, his general condition not improving sufficiently to allow him to return to work, a benefit society to which he belonged insisted on a thorough examination, and he was found to have diabetes. Examination revealed in the right eye pallor of the optic disc with narrowing of the arteries; in the left eye slight pallor of the disc. About the disc in each eye were numbers of white and grayish spots. The right pupil was dilated and irresponsive, and V = p. l. The left eye had normal vision.

The atrophy of the right optic nerve was thought to be due to a fracture through the right optic foramen, and the fundus picture in the left was attributed to a possible hemorrhage in the sheath of the optic nerve, causing pallor of the disc without interfering with the function of the nerve.

A CASE OF ANASTOMOSIS BETWEEN A RETINAL AND A CILIO-RETINAL VEIN.

By JOHN DUNN, M.D., Richmond, Va.

(*With two engravings.*)

ANASTOMOSES between two retinal veins are rarely seen. The following two cases have therefore been thought worthy of report:

In the right eye of Mr. A., aged thirty-six, who consulted me in July, 1898, in regard to an error of refraction, there existed a large anastomotic branch connecting the primary inferior nasal and inferior temporal veins (*vide* Fig. 1). Both retinal veins and arteries were well developed, and the anastomosis, being at some distance from any smaller vessels, was clearly visible. In other respects the fundus was normal.

FIG. 1.

FIG. 2.

This was the first time I had ever noticed this anomaly. Since then I have examined a considerable number of eyes, but have met with no similar case.

In the right eye of Miss H., aged thirty, however, there existed an anastomosis between the main superior nasal vein and a large cilio-retinal vein (*vide* Fig. 2), which made its appearance not far from the edge of the papilla and near the retinal vein, with which it anastomosed.

In the former case the anastomosis occurred after the veins had gotten beyond the disc; in the latter it occurred in the disc. Frost, *Trans. Ophthal. Soc.*, vol. xi., has reported an anomaly similar to the former case.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FIRST QUARTER OF THE YEAR 1898.

By Dr. ST. BERNHEIMER, in Vienna; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Prof. P. SILEX, in Berlin;

WITH THE ASSISTANCE OF

Dr. G. Abelsdorf, Berlin; Dr. Swan M. Burnett, Washington; Dr. Dalèn, Stockholm; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. Krahnstöver, Rome; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. Richard Schweigger, Berlin; Dr. Sulzer, Paris; Dr. L. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; and others.

Translated by Dr. Ward A. Holden.

Sections I.–III. By Prof. C. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

1. Tailor, S. J. The vision of railway officials. *Brit. Med. Jour.*, March, 1898, p. 815.

Tailor reports two cases. The first patient, an engine-driver, had mixed astigmatism in both eyes and a macula in one. The other had myopia, marked astigmatism, and toxic amblyopia.

Werner.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

2. UHTHOFF. On the recent progress in the bacteriology of conjunctivitis and keratitis in man. *Samml. zwangl. Abhand. aus dem Gebiete der Augenheilk.*, edited by Vossius, ii., 5.

3. TANJA. The influenza bacillus. *Geneesk. Tydschr.*, 1898, I., p. 736.

4. ULRICH. On the permeability of the iris and lens capsule for liquids. *Arch. f. Augenheilk.*, xxxvi., p. 197.

5. LIEBRECHT. Studies in the adaptation of the entire retina in the diseased eye. *Ibid.*, p. 211.

6. BULLOT. The regeneration of corneal epithelium under the influence of morphine. *Soc. belge d'opht.*, No. 28, 1897.

7. RANVIER. The histogenetic influence of a previous formation with respect to the degeneration of the membrane of Descemet. *Tribune méd.*, Feb. 2, 1898.

8. BACH. Pathological studies on various malformations of the eye. *Graefe's Archiv*, lxiv., p. 1, 1898.

9. TRUC. Obstetrical lesions of the eye and its adnexa. *Ann. d'ocul.*, cxix., p. 161.

10. GALEZOWSKI. On ocular thermometry and its utility in diagnosing certain affections of the eyes. *Rec. d'opht.*, No. 1, p. 1, 1898.

11. SNEGIREW. On the effect of vibration-massage on diffusion from the conjunctival sac into the anterior chamber. *Med. Obos.*, No. 3, 1898.

12. HINSHELWOOD, JAMES. A case of "word" without "letter" blindness. *Lancet*, Feb., 1898, p. 422.

13. PRUME, JEHIN. Contribution to the treatment of syphilitic ailments of the eyeball. *Ophth. Rev.*, xvi., p. 301.

14. RANDOLPH. Bacteria on the normal conjunctiva and the effect upon them of aseptic and antiseptic irrigations. *Jour. Am. Med. Assoc.*, Jan. 8, 1898.

15. PICK, ALBERT. An experiment on a rabbit's eye to obtain an elastic unbreakable "artificial vitreous body" after evisceration. *Ibid.*

UHTHOFF (2) presents the following list of micro-organisms which are capable of producing conjunctival inflammations in man. The Neisser gonococcus, the Fraenkel pneumococcus, the

Weeks bacillus, the streptococcus, the diplobacillus of Morax, the staphylococcus, and the pseudo-gonococci of follicular catarrh. Occasionally the micrococcus minutissimus (Bach), a new bacillus described by Gromakowski, and the colon bacillus may cause conjunctivitis. The xerosis bacillus is innocent, and the etiology of trachoma is not yet clear.

The micro-organisms known to cause keratitis are the pneumococcus, the streptococcus, and the staphylococci, Pfeiffer's capsule bacillus, the bacillus pyogenes fœtidus, the colon bacillus, the bacillus pyoceaneus, the diplo-bacillus, the ozæna bacillus, the aspergillus fumigatus, and the tubercle and the lepra bacillus.

In a man, aged twenty-eight, a panophthalmitis leading to perforation followed an attack of influenza. TANJA (3) obtained from the pus pure cultures of influenza bacilli. WESTHOFF.

According to ULRICH (4) the aqueous humor can filter through the iris, as well as pass beneath the iris and through the pupil. He was also able to force aqueous humor through the lens capsule under high pressure.

LIEBRECHT (5) finds that adaptation of the eye is not affected by simple opacity of media or in retinitis albuminurica, diabetica, and circinata, or in choroiditis disseminata and plastica. It is greatly affected, however, in chorio-retinitis, retinitis pigmentosa, detachment of the retina, retinal hemorrhage, and excessive myopia. In the parenchymatous inflammations of the optic nerve adaptation is affected, but not in the interstitial inflammations as long as the nerve fibres are not destroyed. The results of the author's experiments in diseases of the central conducting apparatus were not uniform. Hemeralopia is not due to a lack of adaptation but to a delay in the process.

BULLOT (6) cut out portions of the corneal epithelium of equal size in a number of rabbits. Some of the rabbits received morphine injections at regular intervals. It was found that the regeneration of the epithelium was delayed by the morphine. Both the extension of neighboring cells into the defect and cell division were delayed. SULZER.

RANVIER (7) has followed carefully the regenerative processes following injury of Descemet's membrane. The first stage is a proliferation of the endothelium forming many-layered accumulations of cells. The basal membrane appears between the epithelium and the corneal tissue—the proliferation of endothelium having closed the break in the endothelial layer—but not every-

where simultaneously as in the embryo, the earliest formation being only at the margins of the break in the original basal membrane. Thence it extends gradually toward the middle of the defect. The ruptured basal membrane curves toward the cornea so that the convexity of the curved margins points toward the anterior chamber. The new formation of Descemet's basal membrane begins at the curved convexity and not at the margins of the rupture. There is, therefore, not an outgrowth from the ruptured membrane but the formation of a new membrane. This new formation arises through the influence of the old membrane on the proliferating endothelial cells. SULZER.

BACH (8) describes in his paper orbital cysts, typical and atypical coloboma of the iris, coloboma of the zone of Zinn, coloboma of the optic nerve with complete absence of the lamina cribrosa, persistent hyaloid artery, and lenticonus.

TRUC (9) gives a *résumé* of the scattered observations, chiefly in obstetric literature, on the ocular lesions brought about during birth. These comprise muscular paralyses, retinal hemorrhages, and conjunctival suffusions. In one case a rupture of the ball followed the use of forceps on account of a narrow pelvis.

SULZER.

GALEZOWSKI (10) has had made an ophthalmo-thermometer for measuring the temperature of the eye in the living. The bulb is arranged to fit the lower cul-de-sac, where it is allowed to remain three minutes. The normal temperature of the lower cul-de-sac varies from 35.7° to 36.2°.

To determine the degree of diffusion, SNEGIREW (11) used the colorometric method of Bellarminoff. The experiments were made on rabbits, living, and dead from chloroform. Massage of a localized portion of the cornea was done on the right eyes for from two to twelve minutes, after fluorescine had been instilled into the conjunctival sacs. The diffusion was always more marked in the massaged eye. Vibratory massage favored diffusion more than simple massage. The corneal epithelium remained intact.

HIRSCHMANN.

HINSHELWOOD'S (12) patient, a man aet. fifty-three, had an epileptiform fit with general convulsive movements and complete unconsciousness for about an hour after. He was able to go about in two days, but could not read. Eyes normal except for slight incip. cataract. Read letters of text types fluently; $V = \frac{6}{6}$. Could only read very laboriously by spelling out each word,

whether printed or written. He could write to dictation and copy correctly, and also read figures in combination. Fields normal. No verbal-aphasia or amnesia. He subsequently got right-sided paralysis, the face being also involved, and became aphasic, and died. The author refers to a similar case recorded by Burnett (these ARCHIVES, vol. xix., Eng. ed., p. 86), and others by Mierzejewski (*Neurolog. Centralbl.*, Dec., 1890, No. 24, p. 750) and Schweigger (*Graefe's Archiv f. Oph.*, 1876, vol. xxii., Abtheil 3, p. 297). The author believes that there must be a separate area in the visual memory centre for words as distinct from letters alone. WERNER.

As a result of a number of carefully conducted experiments, RANDOLPH (14) concludes that the normal conjunctiva always contains bacteria, but they are of slight or no pathogenetic character. It is admitted, however, that these may become pathogenetic and therefore harmful, under certain conditions, as a bruising of the conjunctiva. No washing of the conjunctival sac with antiseptic fluids can render it free from bacteria. BURNETT.

PICK (15) suggests the substitution of a soft or hard-rubber ball for the glass or silver ball to be used to fill the cavity of the ball after evisceration. It is non-corrosive and being pliable is not liable to break. BURNETT.

III.—INSTRUMENTS AND REMEDIES.

16. EMMERT. Hyoscine (scopolamine) and hyoscyamine. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 10.

17. MEYER, OTTO. Scopolamine and atroscine. *Zehender's klin. Monatsbl.*, xxxiv., p. 19.

18. PARIER. The indications for eucaine and cocaine. *Ophth. Klinik*, ii., 2, p. 29.

19. PINNER. The chemistry of the atropine alkaloid. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 1.

20. PERGENS. Protargol in ocular affections. *Zehender's klin. Monatsbl.*, xxxvi., p. 129.

21. EBERSON. On the use of ichthyol in eye diseases. *Aerztl. Rundschau*, 1898, No. 20.

22. PAGENSTECHER. On the yellow oxide of mercury salve. *Zehender's klin. Monatsbl.*, xxxvi., p. 73.

23. ASCHER. A portable hemispherical perimeter of celluloid for hand use. *Ophth. Klinik*, 1898, No. 5.

24. ASMUS. The sideroscope and its employment. Wiesbaden, 1898. J. F. Bergmann.

25. HINSHELWOOD. On the advantages of Reid's portable ophthalmometer. *Ophth. Rev.*, xvi., p. 327.

26. WÜRDEMANN and BLOCK. A further note on holocaine as a local anæsthetic in ophthalmic work. *Ophth. Record*, Jan., 1898.

27. WEEKS. The electro-magnet of Haab in the removal of pieces of steel from the interior of the eye. *Journ. Amer. Med. Assoc.*, Jan. 1, 1898.

28. HANSELL. The Roentgen ray in ophthalmic surgery. *Ibid.*

29. MCREYNOLDS. A method of employing kangaroo tendon in the operation for shortening ocular muscles. *Ibid.*, Jan. 29, 1898.

30. COLEMAN. Antinosin in the treatment of diseases of the eye and ear. *Ibid.*

31. OLIVER. An improved form of stereoscope. *Ophth. Rev.*, Jan., 1898.

According to EMMERT (16), hyoscine and scopolamine are identical chemically, physiologically, and clinically. In 1 : 1000 solution this is the most satisfactory mydriatic.

MEYER (17) states that scopolamine and atroscine are allied substances, differing only in the amount of water of crystallization and in optical properties. Active hyoscyamine, so-called atroscine, is related to active scopolamine, as active hyoscyamine is related to inactive atropine. Under the same condition in which chemically hyoscyamine passes over into atropine, active scopolamine passes over into inactive scopolamine or atroscine. Some drops of a 0.4 per cent. solution dropped into the eye causes dilatation of the pupil in seven minutes, reaching its maximum in twenty-five minutes, and lasting six to eight days. Scopolamine acts like atroscine. The paralysis of accommodation when the latter is used appears in ten minutes, and becomes complete thirty minutes after instillation. Toxic effects are sometimes observed. In pathological cases atroscine is more active than scopolamine.

In the plants of the solanaceous genus, atropa, hyoscyamus, datura, mandragora, solanum, and anisodus, there are, according to PINNER (19), two alkaloids, hyoscyamine, which, by the action of an isomeric base, is transformed into atropine, and hyoscine or

scopolamine. Duboisine contains hyoscine and other little, studied alkaloids in addition to hyoscyamine.

PERGENS (20) treated a series of conjunctival diseases with 2–20 per cent. solutions of protargol, obtaining a favorable result.

According to EBERSON (21), ichthyol is a certain remedy in the treatment of trachoma, shortening the course of the disease, and bringing about smooth healing. This treatment is especially recommended for children. Ichthyol quickly cures conjunctivitis with or without corneal complications, and is efficacious in clearing up corneal opacities.

According to PAGENSTECHER (22), in preparing the yellow-oxide salve a dilute solution of chloride of mercury must be precipitated with caustic potash, and all chlorine washed off with distilled water. The yellow oxide must be rubbed up very fine, and is best made into a 5–10 per cent. salve with vaselin.

The description of this instrument (25) is contained in the *Transactions of the Royal Society*, vol. liii. It is the same in principle as the ophthalmometer of Javal and Schiötz, except that a single circle is used as an object. The size of the circle can be altered by an iris diaphragm so that the double images can be brought in contact. The differences in the sizes of the discs and the corresponding value in dioptres are recorded on a scale. It is only four inches in length, and does not occupy more space than an ophthalmoscope, and can be used by artificial light or daylight. A difference of 0.5 to 0.25 D can be appreciated.

WERNER.

WÜRDEMANN and BLOCK (26) have continued the use of holocaine in their practice, and are much pleased with its advantages over cocaine. It acts quicker, more thoroughly anæsthetizes the deeper structures and inflamed tissues, the cornea does not become dry, the accommodation and pupil are not affected. It is aseptic and cheaper. BURNETT.

WEEKS (27) reports two cases of attempts to remove bits of steel from the interior of the eye by the large magnet of Haab. In one previously reported in the ARCHIVES OF OPHTHALMOLOGY, it was successful after the original wound had been enlarged. In the other there was a failure, because the foreign body had passed through the eye and was lying on the outside of the sclera near the optic nerve. BURNETT.

In HANSELL'S (28) cases (2) the X-ray was successfully applied in detecting the presence and location of foreign bodies in the

eye. Dr. STERN made the pictures by binding the plate to the temple and bringing the lamp on the opposite side at an angle of 45°. BURNETT.

In order to shorten an ocular muscle when a tenotomy of the opposing muscle is not sufficiently corrective, MCREYNOLDS (29) grasps all the tissues, including the conjunctiva, capsule of Tenon, and tendon of the muscle with a pair of strong forceps in such a way as to form a loop in the tendon. A kangaroo suture is then inserted and tied, holding the tissues in position. These unite and the kangaroo suture is absorbed. BURNETT.

COLEMAN (30) has found antinosin, in a 1 to 2 % solution, a good substitute for formalin in catarrhal, palpebral, and follicular conjunctivitis. It does not irritate like formalin. BURNETT.

Among other modifications of the stereoscope valuable to the ophthalmologist, made by OLIVER (31), are: (1) sphero-prismatic eye-pieces held in separate cells, each graduated as in trial frames, with additional semicircular grooves for other lenses and prisms; (2) each eye-piece so swings into a groove as to permit independent circular rotation in any meridian desired; (3) exact measurement of inter-pupillary distances; (4) adjustment for vertical differences of pupillary centres; (5) also improvement in test holders and test cards. BURNETT.

Sections IV.–VII. By Dr. BERNHEIMER, Vienna.

IV.—ANATOMY.

32. LAFFAY. Nerve anastomosis between the nasal nerve and the lachrymal nerve; anomaly of the ophthalmic ganglion. *Gazette des hôpitaux de Toulouse*, February, 1898.

33. WIELING. The anatomy of the human chiasm. *Graefe's Archiv*, xlv., 1, p. 75.

A complicated anomaly of the ciliary ganglion furnished the anastomosis found by LAFFAY (32) between the naso-ciliary nerve and the lachrymal. At the point of bifurcation of this anastomosis, the naso-ciliary nerve had a small ganglion which sent two small branches to the short ciliary nerve. There was in fact a doubling of the ciliary ganglion. SULZER.

WIELING (33), in two cases of unilateral atrophy of the optic nerve, examined horizontal and sagittal sections through the

chiasm, after staining with the Weigert-Pal method, and found, as so many have done before him, a partial crossing of the fibres. (It is not true, as he states, that embryological studies of the optic nerve have led to no accurate results. The reviewer proved the existence of a partial decussation, in 1888 and 1889, by studying the development of the medullary sheaths in the chiasm (*Arch. f. Augenh.*, xx.; *Wiener klin. Wochenschr.*, 1896, No. 34, etc.); and by two pathological cases studied by Weigert's method he refuted the Michel-Köllicker idea of total decussation.

V.—PHYSIOLOGY.

34. Bernheimer. A contribution to the knowledge of the relationship between the ciliary ganglion and pupillary reaction. *Graefe's Archiv*, xliv., 3, p. 526.

35. Hess. Experimental investigations on the after-images of moving luminous points. *Ibid.*, p. 415.

36. Loeb. On contrast-appearances in the sphere of space perception. *Zeitschr. f. Psych. u. Physiol. der Sinnesorgane*, xvi., 4, p. 298.

37. Burnett, Swan M. On some changes in visual sensations after cataract extraction and especially blue vision (Kyanopia). *Ophth. Record*, January, 1898.

By destroying the cornea of monkeys, while preserving the membrane of Descemet, and afterwards examining the ciliary ganglion by Nissl's method, Bernheimer (34) found that the ciliary ganglion contains the roots of fibres not only for the iris and ciliary body, but also for the cornea—which speaks against the supposed purely sympathetic nature of the ganglion.

The view recently expressed, that in certain cases of isolated reflex iridoplegia, the lesion may be a primary affection of the ciliary ganglion, is opposed by these experiments, since, in accordance with them, a destruction of the ciliary ganglion must needs be accompanied by changes in the cornea, which, however, have never been observed.

Among the unusual sensations experienced after cataract extractions, mentioned by Burnett (37), are a whitish glare over objects, and kyanopia. The latter, he thinks, is due to the residual sensation of white light on the perception apparatus, subjected for months or years only to the light coming through a brown or yellowish lens. Burnett.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

38. SCHREIBER. The indications for the myopia operation. *Festschr. z. F. d. 50 jähr. Bestehen d. Med. Gesellsch. zu Magdeburg.*

39. HAEDIKE. A contribution to the operative treatment of high myopia. *Dissert.*, Berlin, 1898.

40. RECHE. Some remarks on measurement of acuteness of vision. *Arch. f. Augenheilk.*, xxxvi., 1, 2, p. 143.

41. OSTWALT. A contribution to the dioptrics of the eye. *Graefe's Archiv*, xliv., 3, p. 565.

42. THOMAS, C. H. Vicious reading distance as a cause of asthenopia. *Jour. Amer. Med Assoc.*, Jan. 29, 1898.

43. JACKSON. Removal of the clear crystalline lens for high myopia. *Ophth. Record*, Feb., 1898.

SCHREIBER (38), reviewing his own cases of operation for myopia and those of others, stands by those who believe that the indications for the operation are limited.

HAEDIKE (39) has tabulated the 50 myopia operations done in Schweigger's clinic, and concludes that the fundus changes in high myopia continue to be progressive, in spite of extraction of the lens. He believes also that removal of the lens has no effect upon the development of detachment of the retina.

OSTWALT (41) endeavors to prove that it is necessary in practice to return to Donders's numerical designation of refractive errors according to the refractive power of the correcting glass.

THOMAS (42) comments upon the vicious habit of holding work too close to the eyes, thereby entailing a greater amount of accommodation effect. By removing the work to a proper distance, the asthenopia is at once relieved. The vice is most frequent in children. BURNETT.

JACKSON (43) reports one successful case of operation on the transparent lens for myopia. The refraction, as determined by skiascopy, was: R $-$ 13.50 $\bigcirc$ $-$ 3.25 55°, V $= \frac{5}{30}$; L $-$ 18.50 $\bigcirc$ $-$ 1.50 100°, V $= \frac{5}{25}$. Both eyes were operated on by Fukala's method, and in the end vision was as follows: R $+$ 2.50 $\bigcirc$ $+$ 2.75° $= \frac{5}{9}$; L $+$ 2. $\bigcirc$ $+$ 2.160° $= \frac{5}{9}$. A general consideration of the whole question follows, including an account of the change in the size of the retinal image, caused by the removal of the lens. In making the incision for the removal of the corticalis, he suggests that it be made in such direction as shall

lead to the correction, more or less complete, of the determined astigmatism of the cornea, as healing takes place.

BURNETT.

VII.—MUSCLES AND NERVES.

44. DE WECKER. The proportion of curable cases of strabismus. *Ann. d'ocul.*, xix., p. 1.

45. BERNHEIMER. Studies on the innervation of the ocular muscles. *Graefe's Arch.*, xliv., 3, p. 48.

46. GIEBLER. On recurrent oculo-motor paralysis. *Inaug. Dissert.*, Jan., 1897.

47. GRAEFE. On the vision of strabismus patients. *Arch. f. Augenheilk.*, xxxvi., p. 30.

48. ELSCHNIG. Ocular-muscle paralysis from tumor metastases. *Wiener klin. Wochenschr.*, 1898, No. 51, p. 102.

49. REDDINGIUS. Squint. *Arch. f. Augenheilk.*, xxxvi, 1, 2, p. 92.

50. LECHNER. Abnormal voluntary movements of the eyes. *Graefe's Archiv*, xliv., 3, p. 596.

51. BULLER. Anomalies in the functions of the extrinsic ocular muscles. *Ophth. Review*, xvi., p. 363.

52. CARPENTER, J. T. A clinical study of hyperphoria. *Journ. Amer. Med. Assoc.*, Jan. 22, 1898.

53. MURPHY, F. G. Apparent cure of idiopathic epilepsy by the wearing of prisms. *Annals of Ophth.*, Jan., 1898.

54. BAXTER. A method of testing the oblique muscles for the distance—a preliminary statement. *Ophth. Record*, March, 1898.

55. MARLOW. Two unusual cases of strabismus. *Ibid.*, Feb., 1898.

56. BANNISTER. A contribution to the study of the dynamics of the ocular muscles. *Annals of Ophth.*, Jan., 1898.

DE WECKER (44) proposes that the treatment of squint should differ according as one wishes to obtain binocular vision or merely a cosmetic effect. From statistics of 3002 cases of squint he endeavors to find the proportion in which binocular vision is restored. The cases of alternating strabismus with good vision in each eye are the most favorable.

The periodic squint of hyperopes with good vision in both eyes

is cured and binocular vision is restored by using correcting glasses, or there may be spontaneous recovery. When the vision of the squinting eye is less than $\frac{1}{4}$, one cannot count upon obtaining binocular vision. This is also the case in periodic squint of myopes, surgical interference here being necessary and often difficult to carry out successfully. In the most frequent form of squint, permanent unilateral squint, binocular vision is secured in only about one fourth of the cases. It is, furthermore, unnecessary to bother these patients with visual exercises in case the squinting eye has very poor vision. SULZER.

BERNHEIMER (45) was able, by means of experiments on monkeys with the Nissl stain, to determine the location of the various individual nuclei for the muscles supplied by the oculo-motor nerve. Since the nuclear region in monkeys is quite similar to that in man, these results apply also to the conditions in the brain. Schematic drawings illustrate the location of the nuclei and the course of the fibres.

Corresponding to the frequent isolated paralysis of the intrinsic muscles of the eye, their centres are grouped near the median line and are clearly separated from the surrounding centres for the extrinsic muscles, except that the nucleus for the internal rectus lies near the nucleus for accommodation, and the latter near the two sphincter nuclei, so that the associated action of convergence, accommodation, and pupillary reaction is anatomically explained.

CARPENTER (52) finds hyperphoria of some degree in 35 per cent. of his cases. He speaks specially of the spurious form, depending on some condition outside the muscles themselves, as gout, rheumatism, disease of the central nervous system, and abnormal refractive states. These are, of course, not subjects for operative procedure. Only a muscle that is too strong should be cut. The too weak muscles should be advanced or shortened. BURNETT.

MURPHY'S (53) case was that of a man of forty-seven, who had had epileptic attacks for twenty-three years, increasing in frequency lately, till he has had at times several a day. He has insufficiency of the interni of 6°. Having 2° base in each eye he was entirely relieved of his attacks, until he was much reduced in health, when they returned slightly, but again disappeared when health was restored. The prisms were prescribed in July, 1896. A further history of the case is promised. BURNETT.

BAXTER's (54) method consists in placing before each eye a rod or prism, as in the Prince or Holmes phorometer, which converts a distant point of light into a line, as seen by both eyes. If there is no difficulty with the obliques, these lines will be horizontal; if there is, there will be a "dip" in one or the other, the same as in Savage's method of testing for the near. The rotation of the prisms in the phorometer necessary to bring the line that dips again to the horizontal will give the amount of deficiency in the oblique. It has always seemed to the reviewer that those observers dealing with the oblique muscles have not taken sufficient account of the rotating action of the vertically acting muscles in these phenomena.

MARLOW's (55) cases are as follows: 1. Divergence following tenotomies performed in infancy; establishment of binocular single vision at the age of eighteen years; case perhaps originally one of double vertical strabismus. 2. Convergent strabismus due to traumatic paralysis of both sixth nerves during infancy. Correction by operation. BURNETT.

BANNISTER (56) made a careful examination of the condition of the eye muscles of one hundred soldiers of the U. S. army, no one of whom had any complaint of vision or asthenopia, and each in perfect physical condition. The results of these examinations are recorded in a very careful and admirable manner, and are valuable as showing what may be considered as the normal condition of the eye muscles in the average healthy man. His conclusions are as follows:

1. The degree of *adduction* (prism convergence) given by most writers as proper for six metres cannot be reached by healthy eyes except after practice in the use of prisms; hence the standard is too high for attainment in the first office examination, and hence the method of measuring the convergence by adductive prisms is unreliable and misleading. 2. Prism convergence for near (33 *cm*) is also misleading, and is not an accurate test for the real power of convergence. 3. The determination of the punct. prox. of convergence and the calculation of the maximum of convergence after the manner of Landolt are the only true tests of the real power of convergence and of positive convergence. 4. Contrary to the generally received views, *abduction* (prism divergence) for distance can fall well below 6° in healthy eyes, and consequently it is wrong to assume, on this basis alone, that such cases are pathological. 5. There exists in healthy

eyes no positive definite relation between prism convergence and prism divergence for distance, and it is not correct to claim that such eyes should, without practice with prisms, show at 6 *m* a ratio between these functions of 3 to 1, or 7 to 1, in favor of convergence, not permitting abduction to fall below 6°. 6. We may expect sursumduction and deorsumduction for distance to be about the same in degree in about 70 per cent. of healthy eyes, each function reaching 2° in amount. 7. In healthy eyes, orthophoria exists in about 60 per cent. of cases for distance, and in about 82 per cent. for near, and it is wrong to hold that orthophoria for near is abnormal and to be viewed with suspicion. 8. In about 40 per cent. of healthy individuals who have never had any symptoms of eye trouble, there may be found a slight heterophoria for distance, and therefore we should not assume that every patient showing a slight degree of imbalance is, on that account alone, in a serious condition. BURNETT.

Sections VIII.–XII. By PROF. SILEX.

VIII.—LIDS.

57. FEHR. A case of relaxation of the lid, so-called blepharochalosis. *Centralbl. f. Augenheilk.*, xxii., p. 74.

58. SILEX. Unilateral disturbance of vision after blepharospasm. *Arch. f. Psychiat. u. Nervenkrankh.*, xxx., 1.

59. GUTH. A case of sepsis after hordeolum. *Prag. med. Wochenschr.*, 1898, No. 3.

60. GAZZARD. A case of chancre of the lid. *Deutsche med. Wochenschr.*, 1898, No. 6.

61. PECHIN. The ptosis operation. *Arch. d'opht.*, xiii., 2, p. 88.

62. WALDHAUER. On trichiasis operation of the upper lid. *Zehender's klin. Monatsbl.*, xxxvi., p. 47.

63. GRADLE. A case of tarsitis. *Ophth. Record*, March, 1898.

64. WOOD. Primary sarcoma of the eyelid. *Ibid.*

FEHR (57) reports the case of a girl of twenty-one in whom, after recurrent œdema of the lids, the so-called blepharochalosis appeared. The excision of the folds brought about recovery. Microscopic examination of the skin revealed atrophy of all the tissues excepting the blood-vessels, which were dilated and filled with red corpuscles.

After giving an account of the cases in literature of visual disturbance after blepharospasm, SILEX (58) reports two new cases in detail. The actual cause of the visual disturbance is unknown.

GUTH (59) reports a fatal case of sepsis, arising from a hordeolum of the right upper lid. Two days after the appearance of the hordeolum, headache set in and the girl became unconscious. There were marked swelling of the lids and protrusion of the balls and a septic retinitis. The clinical diagnosis was: suppurative meningitis, thrombosis of the cavernous sinus, and septicæmia.

The diagnosis was confirmed at the autopsy. There were right orbital phlegmon, bilateral sinus thrombosis, purulent basilar meningitis, numerous abscesses in the lungs, and extravasations of blood in the skin and pleura. In the pus was found the staphylococcus pyogenes aureus in pure culture.

HERRNHEISER.

GAZZARD (60) reports the case of a boy fifteen months of age, in whom a chancre appeared at the inner end of the right palpebral fissure and the adjoining portions of the lids. The eye proper was not involved. The right pre-auricular gland was swollen. Treatment with iodoform dressings and mercurial inunction led to cicatrization in four weeks. The infection was caused by the father, who kissed the child, and who himself had become infected nine months before.

WALDHAUER (62) makes, with a knife of his own devising, an intermarginal incision, which runs obliquely and divides the skin some lines above the lid margin; a flap of skin is then implanted in the cleft. He has never seen sloughing of the portion of the lid bearing the cilia, which is continuous with the lid tissues only at its ends.

GRADLE (63) describes a case of typical tarsitis in a woman of twenty-four, confined to the right upper lid. He considered the case syphilitic in its origin, as were all the 20 cases which he has found reported in the literature, since Magawly first called attention to it in 1867. A local application of pyrogallol ointment seemed to be very efficacious; specific treatment internally was used. The case has been very chronic in its course.

BURNETT.

WOOD'S (64) case was that of an infant of seven months, on whose right upper lid a tumor was first observed, when it was only six weeks old. This increased in size, and at the time of excision

was about as large as a bean, hard and movable. It evidently had no connection with the tarsus. On examination it was found to be composed of round and spindle cells, some intercellular substance, and an artery with unusually thick walls. Three months after, there was no return. BURNETT.

IX.—LACHRYMAL APPARATUS.

65. WERNER. Myxo-sarcoma of the lachrymal gland. *Brit. Med. Journ.*, Jan., 1898, p. 21.

WERNER'S (65) patient, a man aged thirty-five, had a blow on the eye eighteen years before. A smooth, solid, elastic tumor developed in the position of the lachrymal gland in about four months, causing ptosis, proptosis, and some optic neuritis. V = F. at 2 *m.* The tumor was removed and seemed to be glandular in appearance. Sections showed that, though closely connected with the gland, it was separated from it by a fibrous septum. Professor McWeeney, who made the sections, said that it might be called a sarcoma carcinomatodes; parts were in a state of advanced mucoid change. WERNER.

X.—ORBIT AND NEIGHBORING CAVITIES.

66. LAPERSONNE. Pneumococcus meningitis after operations in the orbit. *Wiener klin. Rundschau*, 1897, No. 36.

67. KATZ. On a plexiform neuroma of the orbit and upper lid. *Graefe's Archiv*, xlv., 1, p. 153.

68. LEE, C. G. Malignant tumor of orbit; partial removal; regrowth; recovery. *Ophth. Review*, xvi., p. 296.

69. TODD, L. B. Evulsioh of eyeball by a blunt hook. *Brit. Med. Journ.*, March, 1898, p. 818.

70. LAWSON. A case of orbital cyst, probably a dacryops. *Trans. Ophth. Soc. Unit. Kingd.*, xvii., p. 233.

71. MOULTON, H. Dermoid cyst of the orbit. *Ophth. Record*, March, 1898.

72. AYRES, S. C. Angio-myxo-sarcoma of the orbit, with report of a case. *Journ. Amer. Med. Assoc.*, Jan. 8, 1898.

73. SHAW, A. J. Spontaneous hemorrhage into the orbit. *Ophth. Record*, Jan., 1898.

LAPERSONNE (66) enucleated in the usual manner an eye with purulent irido-choroiditis due to a perforation with a pair of scissors. On the third day signs of meningitis were observed, and

on the tenth day the child died. The operation wound was normal. In the sheath of the optic nerve and in the exudation at the base of the brain, pneumococci were found in great numbers.

KATZ (67) reports a case of plexiform neuroma of the upper lid and orbit removed by operation. Beneath the epidermis of the lid was a mass of cellular connective tissue containing bundles of nerve fibres which ran in every direction.

TODD'S (69) patient slipped when getting out of a dog-cart, and his eye was torn out of its socket, unruptured, by a hook hanging from the ceiling of the coach-house. All the muscles and optic nerves were torn away close to the globe. Patient made a good recovery.

(In the illustration which accompanies the paper, quite a long piece of the optic nerve is represented as torn out. This agrees with the observations made in cases of auto-enucleation. I have once seen a sad case: a medical student, a pupil of mine, enucleated both his eyes. The muscles were torn out at the junction of muscle and tendon. The optic nerves and sheaths were torn across as far as the optic foramen at least. The globes were unruptured. He recovered rapidly, but is now an inmate of a lunatic asylum.) WERNER.

LAWSON'S (70) patient, a woman aged nineteen, presented a dark-bluish cystic swelling in the upper fornix. No adhesion to skin, no glandular enlargement or pain; some proptosis and considerable ptosis. The cyst, after removal, was in color, size, and shape like a pigeon's egg. The inner surface was rough and shaggy, the wall composed of fine areolar tissue; very few cells lined the inner surface. The fluid contained albumen, no sugar, a small quantity of chlorides, some blood, and transparent bodies staining with hæmatoxylin and having leucocytes attached to them; these were, in fact, fibrin inclosing leucocytes. They were probably due to coagulation by alcohol used in hardening. The best article on dacryops which the author could find was that of Hulke (*Royal Ophth. Hosp. Rep.*, vol. i.). In Lawson's case there was no enlargement of the tumor when the patient wept. The author made a long search, but could find only five undoubted cases on record. WERNER.

MOULTON'S (71) patient was a man of thirty-two, who had had a tumor at the lower edge of the orbit, extending down on the cheek, and gradually increasing in size since infancy. The eyeball was now pushed upward, and was limited in movements;

cornea clear; pupil responsive to light; V = fingers at 2 feet. The tumor was exposed and dissected back to near the apex of the orbit, but was ruptured before it could be taken out as a whole, discharging a gruel-like substance. The walls of the tumor were taken away and the place of attachment carefully scraped. The eyeball was found to be much reduced in size, and on account of the great dilatation of the orbital cavity it was deemed wise to remove it. This orbit was found, on measurement, to be 45 *mm* vertically and 47 *mm* horizontally, the other being 30 and 37 *mm* respectively. BURNETT.

AYRES'S (72) case was that of a woman, sixty-four years old, who noticed that there was a tumor in the right orbit eighteen years before. It was situated at the upper outer angle. It developed slowly. It now filled the orbit, pushing the eyeball down. Movements of eye fairly good; cornea clear; nerve atrophied, p. l. The mass was removed, and was found attached principally to the outer wall. The eyeball was also taken away. The growth was found to be an angio-myxo-sarcoma, very similar to those found springing from the lachrymal gland. BURNETT.

SHAW'S (73) case was that of a woman, forty-seven years old, with the climacteric one year ago, who had sudden hemorrhage into the left orbit without assignable cause. Exophthalmus of half an inch beyond the other eye. No lesion in fundus beyond a slight swelling of the disc. Recovery in about two months, with normal vision and slight restrictions of eye movements.

BURNETT.

XI.—CONJUNCTIVA.

74. IWANOW. On the bacteriology of trachoma. *Wratsch*, 1898, No. 7.

75. RAEHLMANN. On the efficacy of therapeutics in trachoma. Fischer's med. Buchhandlung, Berlin, 1898.

76. SZILI and WEISS. Trachoma. *Report of the Eye Department of the Spital der Pester iss. Gemeinde*, Buda Pest, 1897.

77. ZIEGLER. The surgical treatment of trachoma. *Jour. Amer. Med. Assoc.*, Jan. 15, 1898.

78. WEEKS. The surgical treatment of trachoma. *Ibid.*

79. BURNETT, SWAN M. Hints on the hygiene of trachoma and the influence of altitude and climate. *Ibid.*

80. ELLIS. Trachoma; its relative infrequency in Southern California. *Ibid.*

81. CHEATHAM. The present status of jequirity in the treatment of trachoma. *Ibid.*

82. HOTZ. The treatment of the malposition of the lid border in trachoma. *Ibid.*

83. BAKER. Melano-sarcoma of the conjunctiva, with the report of a case. *Ibid.*

84. CROSKEY, J. W. Foreign body of unusual size retained under the retrotarsal fold of the upper lid for a period of eight months. *Ophth. Record*, Jan., 1898.

85. ALT. A case of acute lymphangiectasia of the right bulbar conjunctiva in an idiotic child. *Amer. Jour. of Ophth.*, Feb., 1898.

86. HOWE. The reasons in one State for a law making Crede's method for the prevention of ophthalmia of infancy obligatory to public institutions. *Ibid.*, March, 1898.

IWANOW (74) cultivated the micro-organisms in the expressed granulations of 35 typical cases of trachoma. Various pathogenic and non-pathogenic micro-organisms were found, all outside of the cells. As regards the finding of a specific trachoma micro-organism, the results were absolutely negative.

RAEHLMANN (75) speaks of the medicamentous, mechanical, and operative means of treating trachoma. Silver is indicated when the disease is of a chronic blennorrhoic character, and copper when there are hypertrophic granulations. Excision of mucosa brings about shortening with entropium, distichiasis, and pannus. Scarification, grattage, curetting, and cauterization should not be used, the only rational surgical procedure being expression, followed by applications of copper. In cases of pannus, expression of the follicles, the use of copper, and lengthening the palpebral fissure are of use, as is also peritomy in some cases. In old pannus, irritants should be used. Trichiasis should be treated by excising the portion of the skin containing the lashes, and grafting in mucous membrane from the lip.

SZILI and WEISS (66) rarely operate on trachoma cases, and mostly rub the granulations with bichloride solution $\frac{1}{2000}$ or $\frac{1}{1000}$.

Deeming a closure of the tear ducts an important factor in the persistence of trachoma, ZIEGLER (77) makes forcible dilatation of the canals with a large probe. The other procedure he advocates is canthotomy for relief of tension on the ball.

BURNETT.

WEEKS's (78) method of dealing with trachoma surgically is to expose all the trachomatous surface and scarify it horizontally with a three-bladed Demarres scarificator. The tissue is then expressed with a Noyes or Knapp forceps, and bichloride 1 to 500 rubbed in with a soft tooth-brush. This is done under general anæsthesia, and the patient is treated as if under a serious operation. BURNETT.

Whatever the cause of trachoma, BURNETT (79) thinks that bad hygienic surroundings, particularly bad air and dust, are very commonly the provoking influences. Dusty occupations or districts should be avoided. General farming is not good. Altitude and climate, *per se*, do not seem to have much influence. BURNETT.

ELLIS (80) has found, from some collective investigations, that in Southern California the percentage of trachoma varies from 0.5 to 1. He makes a distinction between trachoma and follicular disease. Almost all nationalities are represented, but they are mostly "Americans." BURNETT.

CHEATHAM (81) still uses a mild solution of jequirity in the treatment of trachoma, with satisfactory results. Sometimes he simply dusts the powder on, but is careful that the reaction is not severe. BURNETT.

HOTZ (82) insists on making the primary incision in his entropion operation as far from the lashes as possible. This gives greater vitality to the bridge of detached skin. The defective space at the lid margin he fills in with a strip of skin taken from behind the ear. No sutures are required, but both eyes should be bandaged until healing has taken place. BURNETT.

BAKER's (83) case was that of a man of sixty-nine, with a tumor on the eye, noticed one year before as a small dark spot on the nasal side of the conjunctiva. It rather rapidly enlarged, and at the time of operation, fifteen months since it was first noticed, filled the palpebral opening and covered the ball. It was found to be pedunculated, and the mass was removed, with preservation of the eyeball and good vision. The tumor, on examination, proved to be a melano-sarcoma with much pigment. Nine years after, the patient died of cancer of the liver. BURNETT.

In CROSKEY's (84) case a splinter of wood 18 *mm* long, 6 *mm* wide, and 3 *mm* thick, remained in the upper retrotarsal fold, with no considerable inconvenience for nearly eight months. Towards the last, however, a severe conjunctivitis set in, and the

body was found in a mass of granulations. It was removed, the granulations cut off, and under treatment the case was cured.

BURNETT.

ALT (85) describes a case of what he considers to be an enlargement of the lymph channels around the right cornea of an idiotic child of thirteen years. The channels were filled with a reddish fluid. It disappeared in a few days under hot application and massage. BURNETT.

The special statistics of HOWE (86) are for the State of New York, in which there are 438 persons blind from oph. neont., and which cost the State, yearly, $58,622.00. He finds, too, from correspondence, that Crede's method is not in common use in the almshouses, or in districts remote from the large cities. Most of the leading members of the N. Y. Obstetrical Society favor making the employment of Crede's method in public institutions obligatory. BURNETT.

XII.—CORNEA, SCLERA, AND ANTERIOR CHAMBER.

87. LANS. Experimental investigations on the development of astigmatism after non-perforating wounds of the cornea. *Graefe's Arch.*, xiv.; 1; p. 117.

88. LOHNSTEIN. On the treatment of keratoconus. *Wochenschr. f. Therapie u. Hygiene des Auges*, 1898; Nos. 15; 16.

89. RAEHLMANN. On the use of hyperbolic lenses in keratoconus and irregular astigmatism. *Zehender's klin. Monatsbl.*, xxxvi.; p. 34.

90. TERSON. Intraocular infection in adherent leucoma. *Ann. d'ocul.*, cxix.; p. 116.

91. RANVIER. The first modifications of the nerves in simple wounds of the cornea. *Arch. des Sciences*, Dec. 13, 1897.

92. RANVIER. The first modifications occurring in the fixed cells of the cornea in the neighborhood of wounds in that membrane. *Ibid.*, Dec. 6, 1897.

93. MOULTON. Congenital opacity of the cornea. *Jour. Amer. Med. Assoc.*, Jan. 29, 1898.

94. WHEELOCK. Tropho-neurotic keratitis. *Ophth. Record*, Feb., 1898.

95. EATON. Extensive laceration of the eyeball; recovery, with good vision. *Ibid.*

LANS (87) has attempted to correct high degrees of astigmatism by making incisions in the cornea. He deals with theoretical considerations regarding the degree and nature of the changes in curvature, and gives the results of experiments on animals.

LOHNSTEIN (88) reviews all the means that have been used in the treatment of keratoconus: operations, stenopæic apparatus, glasses, etc. The author records in detail his personal experience with his own eyes, and commends the use of cylindrical lenses, which should not be limited to weak numbers. In conclusion he speaks of the means employed to correct the irregular refraction of the cornea: the contact glass devised by Fick, which has proved worthless, and a hydroiascope of the author's which is of some service.

RAEHLMANN (89), in opposition to Lohnstein, believes that hyperbolic glasses are of use, being of benefit in near work sometimes when they do not improve distant vision.

RANVIER (91) observed the following changes after making an incised wound of the cornea: centrally from the wound the nerve fibres disappear, while peripherally the portions of the fibres which are still in connection with their cells of origin begin to bud and form new processes, which anastomose among the epithelial cells which fill the defect. Ranvier believes the cause of the chromatolysis of the ganglion cells which are in connection with the divided fibres to be due to the increased proliferative changes in the latter. The chromatin disappears also in lymph cells, which take an increased part in the nutrition of surrounding tissues.

SULZER.

Forty-eight hours after a wound of the cornea, RANVIER (92) found that the processes of the fixed corneal cells have already reached the level of the margin of the wound. They here bend sharply and cover the surface of the wound. The defect in the cornea is thus covered, beneath the rough covering of epithelium, with a fenestrated membrane containing no nuclei, but being in connection with the neighboring fixed corneal cells through protoplasmic processes.

Ranvier calls attention to the analogy existing between these processes and the outgrowths of the divided axis-cylinders.

SULZER.

MOULTON'S (93) case was that of total corneal opacity in a child of eight, said to have been present at birth. The other (right) eye is myopic and amblyopic, but the cornea is clear.

The opaque cornea is smaller than its fellow. The parents were not syphilitic. BURNETT.

WHEELOCK (94) relates a number of cases of corneal inflammation associated with subnormal sensibility, variable tension, but always minus, contracted pupil, slight pain, with but little circumcorneal injection. These he thinks due to paralysis of some fibres of the Gasserian ganglion, and he has found faradization and hot applications to be the best remedies. BURNETT.

In EATON'S (95) case there was an extensive wound of the anterior portion of the eyeball, involving the sclera, ciliary region, and cornea. The iris was also lacerated, and there was considerable loss of vitreous and expulsion of the lens. In spite of the loss of the lens, with $+ 2. \bigcirc - 4.5\ 180° \text{ V} = \frac{20}{40}$, after healing was thoroughly established. The wound was closed, after having been thoroughly cleansed, by conjunctival sutures.

BURNETT.

Sections XIII.–XVIII. By DR. O. BRECHT.

XIII.—LENS.

95 A. PETERS. Tetanus and cataract (a contribution to the pathology of the lens). Bonn, 1898.

96. NATANSON. A further contribution to the subject of spontaneous absorption of senile cataract. *Zehender's klin. Monatsbl.*, XXXVI., p. 107.

97. HIRSCHBERG. On glass-blower's cataract. *Berlin. klin. Wochenschr.*, XXXV., 6, p. 113.

98. BAECK. On the histology and genesis of lenticonus posterior. *Arch. f. Augenheilk.*, XXXVI., 2, p. 160.

99. HJORT. One hundred cataract extractions with open treatment of the wound. *Norsk. Mag. f. lagevid.*, 1898, No. 3.

100. BORTHEN. On the open treatment of the wound in cataract extraction. *Ibid.*

PETERS (95A) examined the lenses of two women, thirty-six and forty years of age, who suffered from tetanus. The cataracts did not differ clinically from senile cataract, but in one there was a circumnuclear zone of cavities, as in lamellar cataract, and in the other extensive clefts near the anterior surface of the nucleus. The spasm of the ciliary muscle in tetanus interferes with the nutrition of the lens.

NATANSON (96) reports on two cases of spontaneous absorption of senile cataract with unbroken capsule, one of six and one of ten years' duration. The author assumes that in the stage of retrograde metamorphosis structural changes take place in the capsule, allowing the passage of the aqueous through the capsule, and thus facilitating the absorption of the nucleus.

HIRSCHBERG (97) presented five glass-blowers, over forty years of age, who had acquired opacities of the lens. He attributes the formation of the cataract to the continued heat. The opacity appears in the posterior layers of the lens, and progresses slowly.

BAECK (98) reports on two rabbits' eyes with lenticonus posterior. His explanation is as follows: Lenticonus arises from changes in the posterior capsule, the hyaloid artery in process of absorption stretching, and finally rupturing, the capsule. Vitreous liquid then causes the lens fibres to swell and protrude through the break in the capsule.

HJORT (99) gives a statistical report on the course of healing in one hundred cataract operations (complicated and uncomplicated), in which the open treatment was employed. The results were as follows: (1) One case of panophthalmitis, from hemorrhage, (2) one case of iritis with occlusion of the pupil, (3) one case of mild iritis, (4) one case of acute exacerbation of a previously present exudative choroiditis, (5) prolapse of iris in six cases (61 extractions being done without iridectomy), (6) prolapse of vitreous five times yet without influencing the course of healing, (7) no case of corneal suppuration. DALÉN.

BORTHEN (100) reports the case of a restless patient who pulled the bandages off and had to be discharged, with the eyes unbandaged, two days after a double extraction for senile cataract. The result was so good that Borthen was led to treat all his operated patients without a bandage, and in 13 cases he has had the best results. He believes that the bandage disturbs the coaptation of the wound. DOLÉN.

XIV.—IRIS.

101. BENOIT. Anatomical description of a gumma of the iris. *Arch. d'opht.*, xviii., No. 3, 1898.

102. MCGILLIVRAY. Case of upward coloboma of the iris associated with subluxation of the lens downward. *Ophth. Review*, xvii., p. 1.

103. VEASEY. Primary sarcoma of the iris. *Jour. Amer. Med. Assoc.*, Jan. 22, 1898.

After giving an anatomical description of a gumma of the iris which had gone on to purulent degeneration in its central part, BENOIT (101) considered the alleged differences between condyloma and gumma of the iris, and decided that neither clinically nor anatomically is there an actual difference. Both affections begin as a vascular nodule composed of embryonal cells, which may become absorbed, it then being called condyloma, or which may develop further and then break down, when it is called gumma. The nodules may be present in the parenchyma of the iris without clinically presenting a visible elevation on the surface of the iris. The development of the nodule into a gumma occurs the more readily the more virulent the general affection and the less resistent the patient. v. MITTELSTÄDT.

MCGILLIVRAY'S (102) patient had a congenital upward coloboma, with a subluxated opaque lens, the upper edge of which was visible about half way down the coloboma. The lens was removed with a vectis without loss of vitreous with resultant $V = \frac{6}{6}$. He uses the vectis rapidly and fearlessly, avoiding pressure on the globe. A genealogical tree of three generations in which coloboma iridis occurred is given. Five females were affected and one male. The author does not think with Collins that a localized late separation of the lens from the cornea would account for a coloboma extending up to the ciliary region, as the adhesion of the lens and cornea in the fœtus does not reach the periphery. There is also a considerable lapse of time between the separation of the lens from the cornea and the beginning of the development of the iris. A bridged coloboma cannot be explained in this way either. The author suggests as the cause of coloboma in unusual positions an impaired development of the corresponding part of the ciliary ridge. WERNER.

VEASEY'S (103) case of primary sarcoma of the iris was in a man of forty-six years. When seen the eye was in a state of inflammation and painful. The tumor was not so long as the width of the iris, and both the periphery and pupillary edge were free. The tumor was extracted with its surrounding iris tissue. It was 2.5 *mm* long, 1.5 *mm* broad, and 1.5 *mm* thick. An examination showed it to be a pigmented round-celled sarcoma. The lens is slightly opaque, but in spite of this $V = \frac{6}{6}$ now, fourteen months after the operation. An abstract of all hitherto reported cases is given—forty-five in number. BURNETT.

XV—CHOROID.

104. WAGENMANN. On metastatic carcinoma of the choroid. *Corrbl. d. A. d. Vereins von Thüringen*, 1898, No. 2.

105. LAGRANGE. On metastatic carcinoma of the choroid. *Arch. d'opht.*, xviii., 1, p. 30.

106. LEBER and KRAHNSTÖVER. On phthisis of the eyeball in cases of choroidal sarcoma and on the importance of injuries in the development of these tumors. *Graefe's Arch.*, xlv., 1, p. 164, and 2, pp. 231, 267.

107. SCHIECK. On the point of origin and the pigmentation of choroidal sarcoma. *Ibid.*, 2, p. 433.

108. WERNER. Sarcoma of the choroid. *Brit. Med. Jour.*, Jan., 1898, p. 21.

109. BURNETT. A study of ocular coloboma. *Amer. Jour. of Ophth.*, March, 1898.

WAGENMANN (104) observed rapidly developing blindness and detachment of the retina in a woman of forty-five who had been operated on for tumor of the breast a year before. A tumor was suspected and the eye was enucleated. A month later the second eye was attacked, and four months later the patient died. This is the twentieth case reported, seven of which have been bilateral. The prognosis is very bad. No patient has lived longer than a year.

LAGRANGE (105) observed the development of a typical carcinoma of the choroid in a woman of forty-eight, three years after the removal of a carcinoma of the breast. It led rapidly to blindness and secondary glaucoma, necessitating enucleation, and the patient died two months later of general metastases. In the enucleated eye there was found a flat carcinoma of alveolar structure in the temporal portion of the choroid and an independent carcinomatous focus in the temporal portion of the iris. Some of the vessels passing through the sclera were filled with carcinoma cells. The uninvolved retina was but slightly detached. A *résumé* of 19 cases previously reported is given.

According to LEBER and KRAHNSTÖVER (106) the appearance of choroidal sarcomas in eyes already phthisical is merely due to chance, their appearance after tracoma not having been sufficiently proven. Phthisis bulbi however is frequently the result of sarcoma, being brought about through irido-cyclitis. The development of the latter is favored by the tumor, since micro-organisms

which have been carried there find favorable conditions for development in the dead cells of the tumor and total necrosis of the tumor is brought about. The inflammation then, in consequence of disturbances in secretion, proceeds to phthisis.

SCHIECK (107) examined anatomically twenty cases of sarcoma of the choroid and he came to the following conclusions: White tumor masses at the surface of choroidal sarcomas, containing connective-tissue tracts and distinguished from the surrounding tumor by their peculiar angio-sarcomatous or endotheliomatous structure, have in all probability arisen primarily from the chorio-capillaris. A proliferation of the deep layers of the choroid in these cases is to be considered secondary, the extension of the tumor in the layers of large vessels not indicating the development of the tumor from this layer. In their later course primary leucosarcomata of the chorio-capillaris may become pigmented, by the sarcomatous process extending into the pigmented layers, eroding the vessels, and causing the carrying in of chromatophores.

WERNER'S (108) patient, a lady aged fifty, noticed three years before that she could not see faces with the right eye and the sight disappeared from above downward. An acute attack of glaucoma followed. When seen, there was no p. l., widely dilated pupil, shallow ant. ch., ectropion of iris pigment. The ophthalmoscope showed a smooth yellowish detachment of the retina with only a few narrow folds at the edge. Some deep vessels and a few hemorrhages were also visible. After removal and hardening in formalin, sections proved it to be a spindle-celled sarcoma with scattered spots of pigment. The tumor consisted of a flat base connected with a globular portion by a narrow neck. The iris was adherent to the cornea at the periphery. WERNER.

BURNETT'S (109) conclusions are based upon a study of some cases of his own, one of which (including both eyes) is given in detail, with drawings representing the condition of the fundus and the iris. His conclusions are that the appearances are not due, as is commonly believed, to a failure of the fœtal cleft to close, since practically the fœtal cleft of the primary vesicle is always closed by the mesoderm from which the choroid, sclera, and vitreous are developed. As this region, however, is the focus of many developmental forces, there is more likely to be some diversion or defective process set up which will result in a wakening of the tissues, allowing them readily to take on pathologic action. Most of the appearances he thinks due to this and the

result of intra-ocular pressure on the weakened tissue. A badly developed vascular system is also, probably, at the bottom of much of the developmental failure, especially as regards the iris colobomas. BURNETT.

XVI.—VITREOUS.

110. GROENOUW. On a parasite (distomum?) in the vitreous of the frog, with remarks on the entozoa found in the eye. *Zehender's klin. Monatsbl.*, xxxvi., pp. 60, 85.

111. DE SCHWEINITZ. Blood-vessel formation in the vitreous. *Ophthal. Record*, Jan., 1898.

112. FOX, L. W. Implantation of a glass ball for the support of an artificial eye, and Mules's operation for the substitution of enucleation of an eyeball. *Jour. Amer. Med. Assoc.*, Jan. 8, 1898.

GROENOUW (110) describes a parasite in the eye of a frog (rana esculenta). The parasite is 0.5 *mm* long and 0.1 *mm* thick, and appears to attach itself by its pointed end while the thicker end lies movable in the vitreous. The refractive media are clear. The entozoön is of white color, not transparent, exhibiting no details of structure, but possessing the power of motion. The author regards the parasite as a young form of a distomum or monostomum.

DE SCHWEINITZ'S (111) case was that of a young man of twenty-six, of good health and history, except a very improbable infection of syphilis. R. eye normal and V = $\frac{6}{6}$ after correction of 1 D of hypermetropia. L. eye shows all the appearances of the so-called retinitis proliferans, with formation of blood-vessels in the vitreous. It requires + 6. and + 7. to see some of these masses. Nothing except a few faint lines in the vicinity of the *m.l.* V = $\frac{6}{6}$ after correction of 0.25 D of astigmatism A fine chromo-lithographic picture accompanies the paper.

BURNETT.

FOX (112) has fourteen times implanted a glass ball into the scleral cavity of the stump of an enucleation, in order to form a firmer and better support for an artificial eye. Two balls came out 10 months after the operation. The edges of the conjunctiva are brought together by 5 or 6 stitches; usually, no pain follows the operation. He also gives the results of his experience with Mules's operation, using now a silver instead of a glass ball, for

insertion into the eviscerated globe. This experience has been highly satisfactory in the 82 cases in which these operations have been performed by him. BURNETT.

XVII.—GLAUCOMA.

113. POLLAK. Experiences during 38 years of ophthalmic practice, with large paracentesis of the sclerotic, with ciliotomy, in acute glaucoma (Wm. Hancock's method). *Amer. Jour. of Ophth.*, March, 1898.

114. AYRES, C. S. Onset of acute glaucoma, characterized by enormous conjunctival chemosis, and very rapid failure of vision; iridectomy; recovery of sight. *Ibid.*

POLLAK (113) reports that in 38 years he has performed large paracentesis of the sclerotic, with ciliotomy, between 60 and 70 times without a single failure. The method he learned from Wm. Hancock himself, who inserted a Beers knife at the lower-outer scleral border and passed it down and back till the sclera showed a 3 *mm* section. BURNETT.

The interesting feature in AYRES's (114) cases of glaucoma is its sudden onset, with an extreme chemosis of the conjunctiva. In a few hours V was reduced to counting fingers at 10″; T + 2. An iridectomy was done, and perfect vision was recovered. BURNETT.

XVIII.—SYMPATHETIC OPHTHALMIA.

115. BLUMENFELD. A case of sympathetic ophthalmia that recovered. *Inaug. Dissert.*, Kiel, 1898.

116. AYRES, S. C., and ALT. Sympathetic ophthalmia; rapid failure of vision in injured and sympathizing eye; improvement after enucleation, with subsequent relapse and final partial restoration of vision. *Amer. Jour. of Ophth.*, Feb., 1898.

The clinical part of this case is by AYRES (116), and is the history of a perforating wound in the left eye of a girl of ten years, ten weeks before. The scar was at the lower inner quadrant of the sclero-corneal junction, where there was incarceration of the iris. V = fingers at 6′. Sympathetic irritation with a rigid pupil in right eye, coming on seven weeks after the accident. V. was rapidly reduced until fingers were counted at 3′. Injured eye enucleated. Vision improved to counting fingers at 24′, but was reduced to fingers at 2′ after a chance blow on that eye by a playmate.

Histological examination by ALT given in much detail. A very careful search gave no evidence of any microbe. The changes found were all due to a severe inflammation of the uveal tract, optic nerve, and pia mater sheath. This had led to secondary shrinkage of the vitreous body, and finally to the formation of cystic cavities in the posterior layers of the iris, and to detachment of the retina as a whole, and, in places, of the membrana limitans interna. BURNETT.

Sections XIX.–XXII. By PROF. GREEFF.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

117. ELSCHNIG. Anastamoses of the retinal veins. *Zehender's klin. Monatsbl.*, xxxvi., p. 55.

118. AXENFELD. Remarks on Elschnig's paper, "Anastomoses of the retinal veins." *Ibid.*, p. 106.

119. SCHOEN. The cause of retinitis pigmentosa. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 15.

120. JENSEN. On retinitis circinata. *Hospital tidende*, 1898, No. 5.

121. MARKEN. Endarteritis obliterans arteriæ centralis retinæ diffusa. *Wjest. Ophth.*, 1898, No. 2.

122. DANIF. A peculiar case of commotio retinæ. *Oogheelk. Bydragen*, v., p. 48.

123. EYRE. Albuminuric retinitis. *Ophth. Review*, xvi., p. 269.

124. SYMONDS. Two cases of night-blindness. *Brit. Med. Jour.*, Jan., 1898, p. 212.

125. KINGDON and RISIEN RUSSELL. Infantile cerebral degeneration, with symmetrical changes at the macula. *Trans. Royal Medico-Chirurg. Soc.*, London, lxxx., 1897.

126. GRADLE. Anomalies of the retinal pigment epithelium and their clinical significance. *Jour. Amer. Med. Assoc.*, Jan. 22, 1898.

127. SIMONSON. Amblyopia ex anopsia, with a case. *Ibid.*

128. CONNER, L. Amblyopia from suppression, congenital imperfection, or disuse; which or all? *Ibid.*

129. WERNER. Glioma of the retina. *Brit. Med. Jour.*, Jan., 1898, p. 21.

ELSCHNIG (117) is of the opinion that Gloor's case of new form of vessels formation (*Arch. f. Augenheilk.*, xxxv.) was not of a con-

genital nature, but due to pathological changes. He reports two similar cases of excessive dilatation and tortuosity of the veins with anastomoses, in old people with various senile changes in the eyes. The cause of these anomalies is a primary degeneration of the vessels which by themselves or through consecutive thrombosis produce circulatory disturbances at various points, thus causing the dilatation of capillaries connecting the retinal veins, and also the new formation of capillaries.

AXENFELD (118) also believes these changes to be due to obstructions to the circulation. He has reported two cases of this sort in the *Berl. klin. Wochenschr.*, 1896, No. 41.

SCHOEN (119) states that it was formerly not the custom to examine carefully the anterior segment of the eye, and that when it is examined peripheric foci of choroiditis are found in many cases in which their presence was not suspected. The question whether choroiditic foci are always present in retinitis pigmentosa must again be taken up.

JENSEN (120) mentions the different views on retinitis circinata (Goldzieher, Fuchs, de Wecker), and reports a case which supports de Wecker's view of the near relationship between retinitis circinata and hemorrhagic retinitis. A woman of twenty-six had, at the first examination, symptoms of typical hemorrhagic retinitis, but later the ophthalmoscopic picture changed, so that after eight months it corresponded to that of retinitis circinata. In the opinion of the author, therefore, retinitis circinata is not an independent form of disease, but is a stage of hemorrhagic retinitis.

DALÉN.

EYRE (123) records two cases in which retinitis appeared before any albumen or signs of nephritis were detected. In one case the post-mortem and clinical history pointed to an acute nephritis. The cases are carefully observed and recorded.

WERNER.

SYMONDS'S (124) patients were two brothers, æt. twelve years and five years. They had never been able to find their way after dark, vision in daylight being good. V of elder boy = $\frac{6}{9}$. Fields much contracted. Slight pallor of disc and some periarteritis; no pigmentary changes. There were three sisters unaffected. Parents were second cousins. WERNER.

This paper (125) contains records of four cases of the disease first described by Tay, in the *Ophthalm. Soc. Transactions*, 1881. Three of the author's cases belonged to one family. The longest-

lived was twenty months. The clinical history, based on all recorded cases, shows three stages: 1st. About the third month, some weakness of the neck and back occurs along with bad sight; a soft-edged, oval, gray patch, two disc diameters in size, is seen at the m. l.; in the centre is the dark-red fovea. Optic atrophy later. 2d. Child is helpless and unable to move. 3d. Muscular atrophy follows. Deep reflexes exaggerated later; rigidity of the extremities and retraction of the head take place.

Post-mortem examination was made in three cases. There was bilateral primary degeneration of the cerebral cortex, with secondary degeneration of the corona radiata and pyramidal tracts. Degenerative changes also in the descending root of fifth nerve, the fillet, and the superior cerebellar peduncles. The outer molecular layer of the retina at the macula was increased in thickness. WERNER.

GRADLE (126) has noticed in quite a number of cases a peculiar change in the fundus, usually most pronounced in the inferior nasal quadrant. It is a granular appearance, as if the surface had been covered with a mixture of black and reddish powders. Some of the black points are quite large. It usually affects both eyes. The important clinical fact he points out is that it is found associated most commonly with some nervous disturbance. Vision is not usually affected by it. BURNETT.

SIMONSON'S (127) case was that of a girl of eight, who squinted with the left eye, with vision less than fingers at four feet. R V $= \frac{1}{10}^{6}$ with + 2. With + 2. V in left was brought to $\frac{1}{10}^{6}$. With correction of both eyes (+ 2.5), constantly worn, the strabismus disappeared, and vision in the left came up to $\frac{1}{10}^{6}$, at which it has remained for some years. BURNETT.

From a careful study of his cases, CONNER (128) concludes that there are undoubted cases of amblyopia from congenital affections. These may or may not squint. These cases may be still further crippled by disuse, and use brings back the vision normal to that eye. There is no such thing as loss of vision from suppression or inhibition of the visual centre. These are cases of lack of persistent vision, due to non-use or diminished use. These are never congenital and are often improved by proper management. All cases of amblyopia, with or without squint, should be studied at the earliest moment, and every deviation from the normal in refraction or movement corrected. BURNETT.

The patient (129) was a boy aged three years. A white shining

appearance was seen in the pupil a year before. Five other children in the family quite healthy. The eye, which was enlarged and glaucomatous, was removed, and the orbit scraped. The child improved in health, but was taken away before the other eye could be examined. It was reported a month later that the tumor was growing again ; the child was ill and vomiting its food, and the left eye was blind. The eye which was removed was completely filled by the tumor, the lens was pressed up against the cornea, and a dark line of pigment separated from the sclerotic behind indicated the remains of the choroid. The cells of which the tumor was composed contained hardly any protoplasm round the nuclei, and frequently showed mitoses. There were patches of cheesy necrosis, with a few micro-organisms in them.

WERNER.

XX.—OPTIC NERVE.

130. DAGILAISKI. A case of choked disc, with restoration of vision after total blindness for three weeks. *Zehender's klin. Monatsbl.*, xxxvi., p. 63.

131. WEYL. A new explanation of the origin of œdematous optic neuritis. *Ophth. Klinik*, ii., 2, p. 27.

132. ELZE. A case of hemorrhagic neuro-retinitis cured by the administration of iron. *Wochenschr. f. Therapie u. Hygiene d. Auges*, i., 20, p. 153.

133. GINZBERG. A case of recurrent retrobulbar neuritis. *Wjest. ophth.*, xv., 1, p. 32.

DAGILAISKI'S (130) patient, a man of twenty-six, had become suddenly blind three days before he was first seen. The pupils were dilated ad maximum and irresponsive, and V = 0. A well-marked choked disc was found in each eye. The patient had been infected with syphilis, and antisyphilitic treatment was undertaken. No improvement was obtained, and the patient was discharged, blind. Later, after a second course of treatment, vision became 0.2 in the right eye. Uhthoff has reported two similar cases.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

134. THOMPSON, J. T. Foreign body retained in the cornea. *Brit. Med. Journ.*, Feb., 1898, p. 368.

135. GRIFFITHS. Some cases of intraocular cysticercus, and one case of intraocular hydatid. (With plate.) *Trans. Ophth. Soc. Un. K.*, xvii., p. 220.

In THOMPSON'S (134) case a bit of lead was retained in the cornea for twenty-two years; it was the patient's working eye, and gave no trouble until he got a "swish" of a cow's tail while milking. Thompson removed the foreign body, after which $V = \frac{6}{9}$. WERNER.

GRIFFITHS (135) records six cases of intraocular cysticercus which were observed in the Manchester Eye Hospital. In most of the cases the ophthalmoscopic diagnosis was certain, while in others only a bluish rounded mass of lymph in the vitreous could be seen.

The frequency of intraocular cysticercus in Manchester was 1:36,000 eye cases.

The last case recorded was one of hydatid cyst. The patient, a girl æt. three years and eight months, was blind from what, on casual observation, looked like a posterior polar cataract. No injection; Tn. There was a white, opaque, glistening, non-vascular substance in contact with the back of the lens, which was not concave but flat. With dilated pupil, no free edge could be detected. After enucleation, the interior of the eye was found to be lined by a dense continuous membrane adherent to lens, ciliary body, and retina. The cyst wall was composed of numerous structureless lamellæ, the most internal in places becoming detached and curled in. The cyst-wall sections were compared with those of an undoubted hydatid, and were found almost identical in appearance. WERNER.

XXII.—OCULAR DISTURBANCES IN GENERAL AFFECTIONS.

136. PEL. Ocular crises in tabes dorsalis. *Berl. klin. Wochenschr.*, 1898, No. 2.

137. STRENZEMINSKI. Ocular complications of ophthalmic zona. *Rec. d'opht.*, Jan., 1898, p. 10.

138. NATHANSON. On eye affections with parotitis. *Med. sueje Oborsen*, 1898, 3.

139. WÖLFLER. Demonstration of a case of resection of the Gasserian ganglion. *Prag. med. Wochenschr.*, 1898, No. 15.

140. GOURFEIN, MARIGNAC, and VALETTE. A case of primary ocular glanders. *Revue medicale de la Suisse romande.*

To Charcot's school is due the credit of first directing attention to the peculiar and often wrongly interpreted crises of tabes. These are mostly of an irritative character and are due to transient disturbances of nutrition in various portions of the nervous system. PEL (136) reports a case of tabes with beginning dementia, in which there were transient attacks of pain in the eyes followed by lachrymation and photophobia. The author regards these as true ophthalmic crises or tabic ciliary neuralgias, with marked vasomotor and secretory symptoms.

STRENZEMINSKI (137) collects in a monograph all that is known of herpes zoster frontalis, adding two new cases, one of which was complicated with a partial atrophy of the optic nerve.

SULZER.

NATHANSON (138) reviews the literature and reports the case of a boy of sixteen who had first a bilateral dacryoadenitis and later a parotitis. Since in mumps the parotitis usually precedes the dacryoadenitis, Nathanson believes that in his case both affections are to be regarded as symptoms of influenza.

HIRSCHMANN.

WÖLFLER (139) presented a woman, aged forty-eight, on whom in the last ten years, on account of neuralgias in the second and third branches of the right trigeminus, all possible extra-cranial operations had been done without relief. Wölfler then resected the Gasserian ganglion after the method of Krause. Following the operation there was a transient paralysis of the extrinsic and intrinsic ocular muscles, due to the tearing of the oculomotor, trochlearis, and abducens nerves. A corneal ulcer also developed and the conjunctiva remained anæsthetic. HERRNHEISER.

GOURFEIN (140) observed a case of primary infection of the conjunctiva and tear passages with glanders. A girl twelve years of age was brought to him with a lachrymal fistula on the right side, of twelve days' duration, and no previous history of lachrymal trouble. On account of the peculiar appearance of the fistula a bacteriological examination was made three months later, after granulations and ulcers had appeared in both retrotarsal folds. Inoculations in guinea-pigs then proved conclusively the existence of glanders infection and the absence of tuberculosis. SULZER.

BOOK REVIEW.

Tests and Studies of the Ocular Muscles. By ERNEST E. MADDOX. Bristol: John Wright & Co. Pp. xv., 419; 112 illustrations.

This little book can be unreservedly commended both for the excellence of its matter and for the lucidity with which the subjects treated of are presented. The author has gone very thoroughly over the ground; not only giving an excellent résumé of all the more important methods used in diagnosticating muscular anomalies, but also giving, what is very essential for the understanding of the subject, a clear and sufficiently full statement of the anatomy and physiology of the ocular muscles. This fact deserves to be the more emphasized, because it is to be feared that much is done in the way of treating muscular anomalies (especially by operation) which would not be done if these fundamental facts of anatomy and physiology had been known or properly appreciated. Yet to treat muscular anomalies without a complete comprehension of these facts is as empirical and as unsafe as it would be for one to prescribe glasses who knew nothing of the principles of optics or of the physiology of accommodation.

Dr. Maddox's book is not only full, accurate, and lucid, but also, as a rule, very well proportioned. A possible exception is the part on the diagnosis of muscular paralyses, which seems somewhat over-elaborated. A simpler scheme than the one he proposes should apparently suffice. The reviewer has generally found no difficulty in impressing upon students simple rules, which nevertheless answer for the diagnosis of even complicated or combined paralyses. A student who has once been thoroughly drilled in the physiology of the ocular muscles, will seldom experience much trouble in diagnosticating their paralyses.

In the reviewer's experience, the vertical diplopia in paralysis of the superior and inferior recti generally shows an increase when the gaze is carried toward the side of the affected eye, more marked and more rapid than is indicated in the diagrams on pp. 276 and 278.

In speaking of the field of fixation, the author has overlooked the most delicate and readily applicable test-object, the fine double dot, which much surpasses the use of fine type for this purpose.

In speaking of the different varieties of innervation governing the ocular movements, he fails to mention the divergence-innervation, the existence of which has long been suspected, and which now seems to be definitely proved by a number of clinical facts, and particularly by the discovery of a true divergence-paralysis unassociated with paralysis of abduction (Uhthoff).

These small defects obviously detract but little from the merits of the book, which may be characterized as reliable, readable, and exhaustive. A. D.

MISCELLANEOUS NOTES.

Dr. CASEY A. WOOD has been appointed clinical professor of ophthalmology in the Chicago College of Physicians and Surgeons (Med. Dept. of Ill.).

Dr. FRANK VAN FLEET and Dr. J. EDWARD GILES have been elected surgeons to the Manhattan Eye and Ear Hospital, New York.

Miss HELEN GOULD, of New York, has donated $5000 to the Manhattan Eye and Ear Hospital, for the foundation of a free bed in perpetuity.

Contents of the last number of the Arch. f. Augenhk. (German Edition of these ARCHIVES).

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1. SCHMIDT-RIMPLER (Göttingen). On ulcus rodens corneæ.
2. FRÖHLICH, CONRAD (Berlin). On spontaneous and post-operative detachment of the retina in myopia.
3. KOSTER, W. (Leiden). On the possibility of filtration through the iris, choroid, and lens capsule.
4. NAGEL, W. A. (Freiburg-i.-B.). On congenital color-blindness.
5. NEUSTÄDTER, O. (Munich). Unilateral nystagmus.
6. HOLDEN, W. A. (New York). On fluttering by juxtaposition of colors and of white and black (translated from the English edition, January, 1898).
7. TOBLER, THEO. (Basel). Experiments on the effect of posterior sclerotomy.
8. Report of the HEIDELBERG OPHTHALMOLOGICAL SOCIETY, August, 1898. Translation published in the September number of this volume, p. 541.

Erratum.—Page 470, line 7, read miotics instead of mydriatics.

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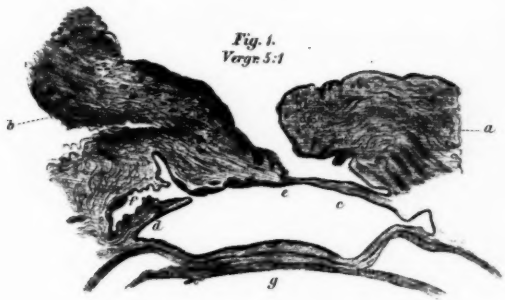

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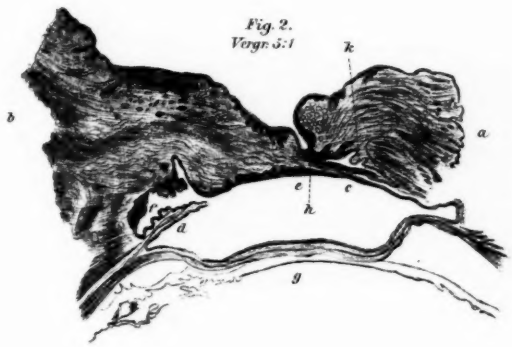

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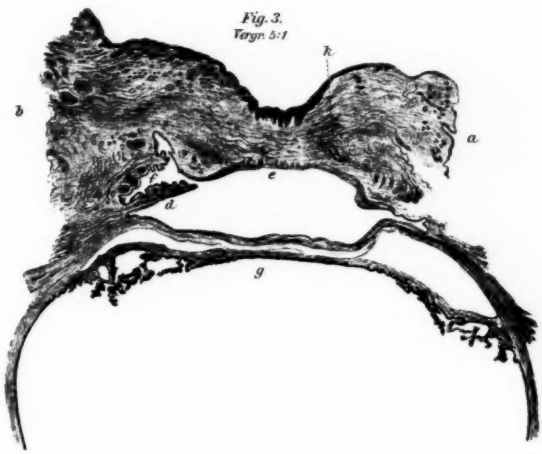

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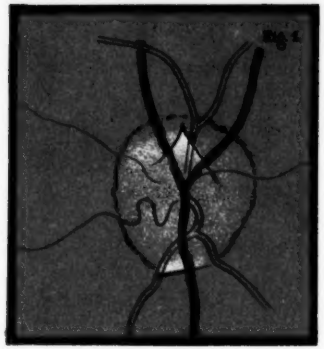

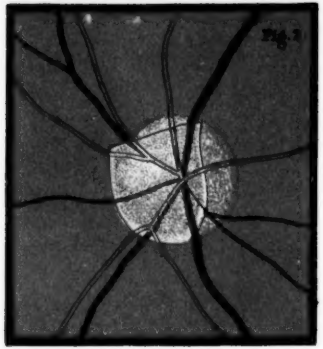

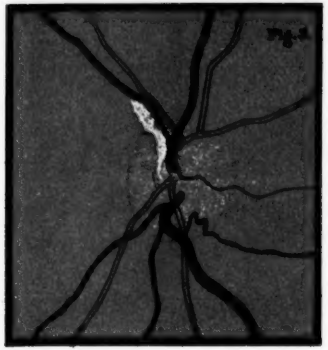

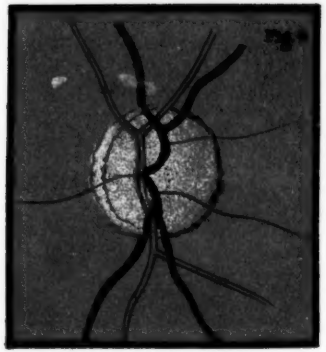

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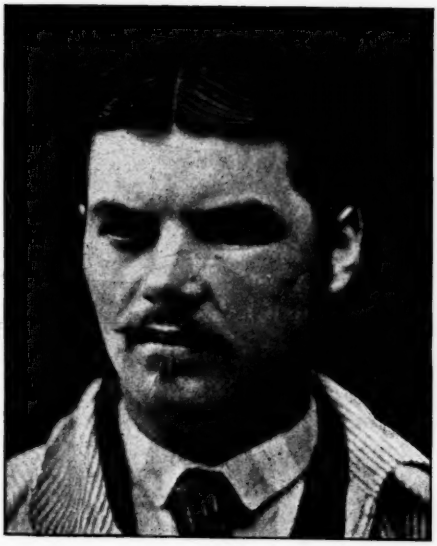

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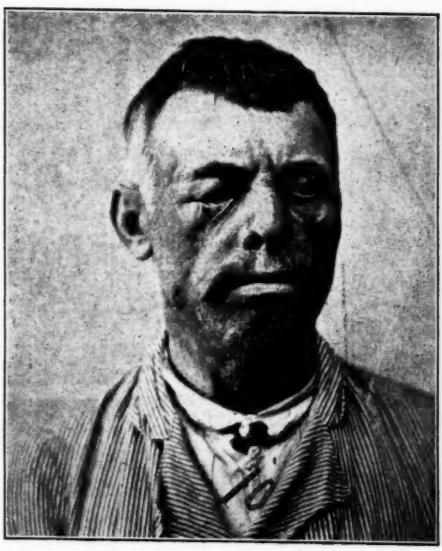

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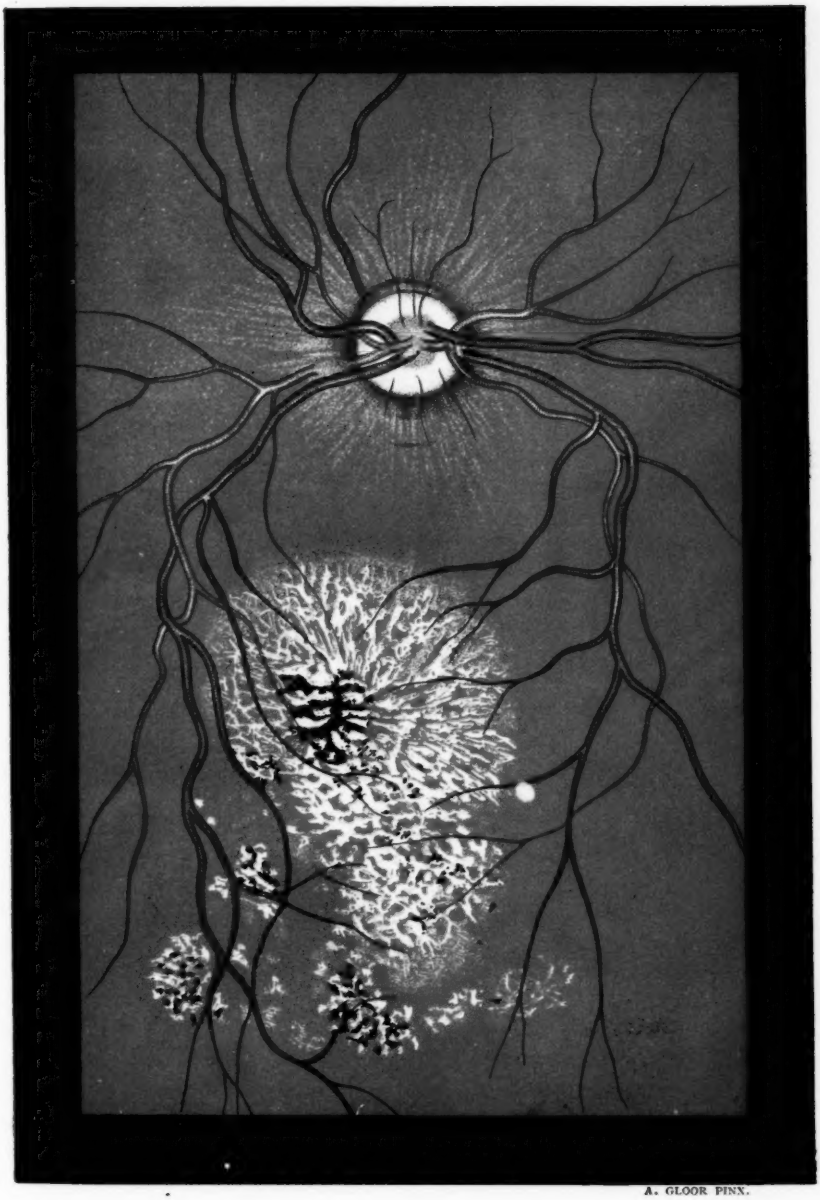

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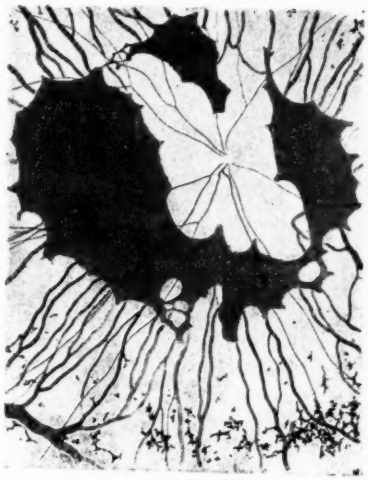

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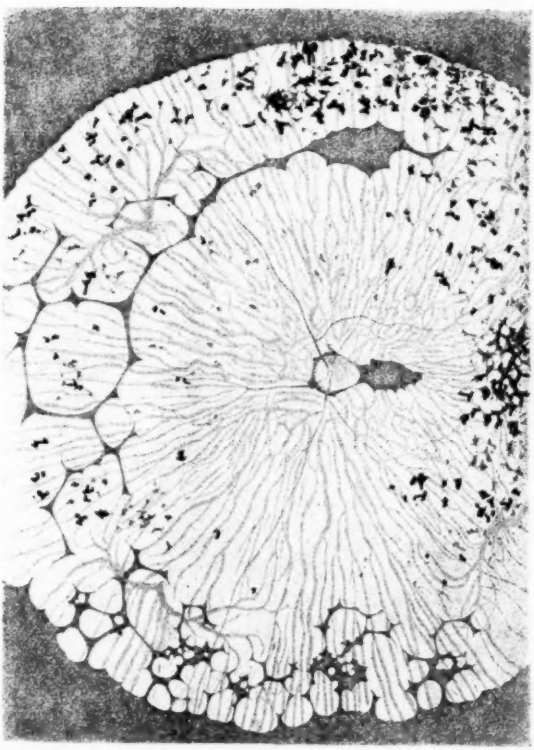

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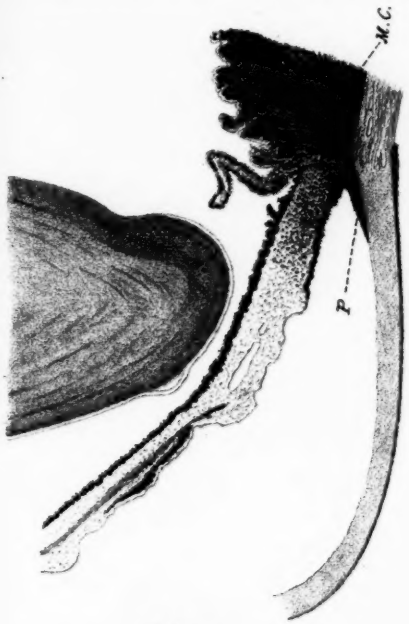

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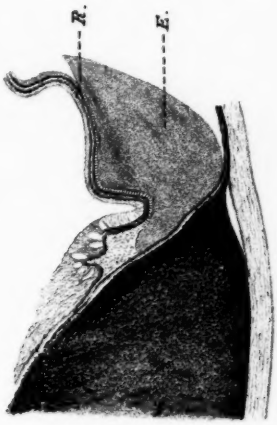

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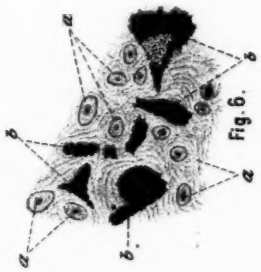

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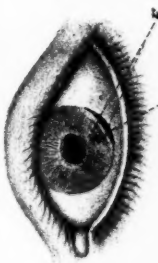

Fig. 1.

Fig. 2.

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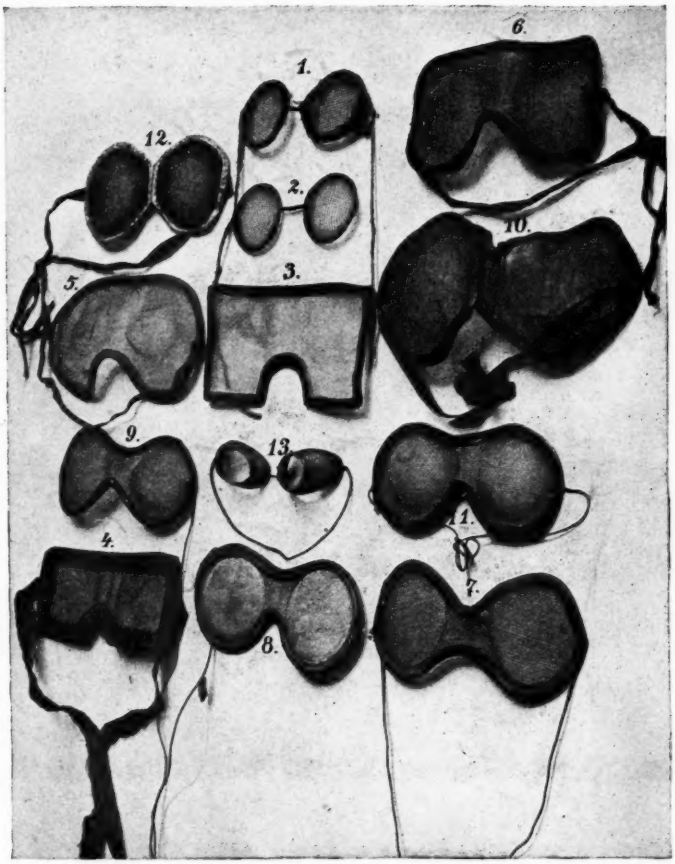

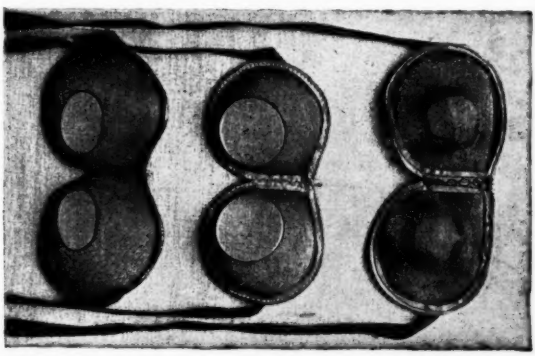

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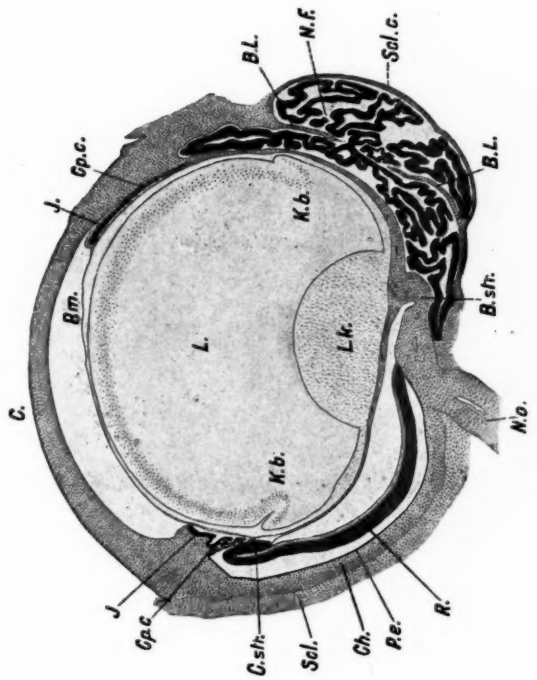

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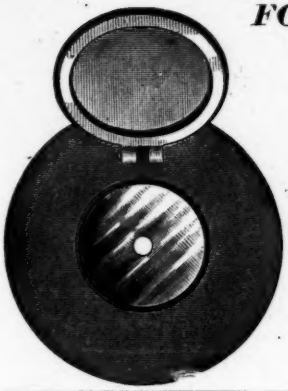

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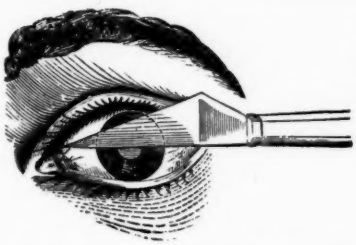

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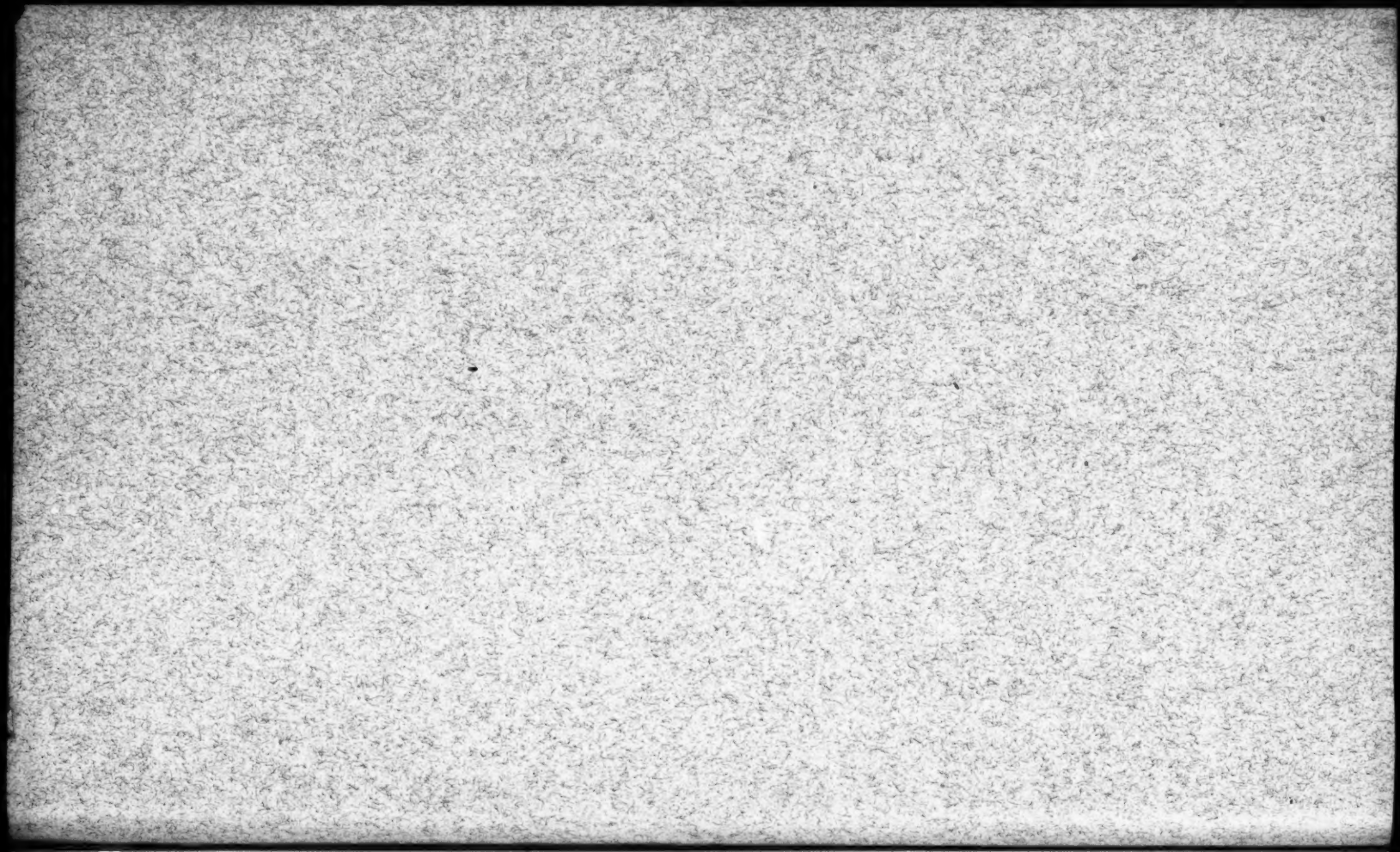
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